



FRIDAY, AUGUST 7.

Contributions.

Piece-Work in Railroad Shops.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in your issue of July 10 a communication on "Piece-Work in Railroad Shops," in which the writer takes the ground that there are insurmountable difficulties in the way of introducing it for repair work in railroad shops so that it can be done profitably.

This may be the case in railroad shops that are not equipped for doing a large amount of work, or where a small number of men are employed and have to be shifted from one job to another, as the exigencies of the service may require; but in shops that are well equipped with a large number of tools there does not seem to be any difficulty in introducing piece-work, even where repair work is done. This is being done in several railroad shops in this country, both in machine shops and in repairs of locomotives or cars. The difficulty cited by your correspondent in turning tires is not an important one, because a record kept of the average time taken in turning locomotive or passenger car wheel tires will soon show what the true average time is for doing this work, on which to fix a price by the piece.

Of course there may be times when several sets of tires will require more work, and the workman may lose a little money on the job, but again he may have a run of tires requiring very little turning, thus making more than ordinary wages.

Piece-work in the repairs of locomotives can be carried to the extent of a fixed price to be paid the men for disconnecting engine, taking out wheels, taking out steam-pipes, cutting out and resetting flues, taking up steam chests, facing valves, putting them down again, etc., etc. In the repairs of cars, especially of freight cars, piece-work prices for doing such jobs as taking out the outside, intermediate and centre sills and replacing them with new ones; replacing truck bolsters, removing and applying wheels, can be made, and with a great deal of economy to the company and profit to the men, because, in cases of this kind, a better system of doing the work is instituted, and the individual workman is interested in the success of each job and in the result of his own labor.

In working up a system for doing repairs by the piece in railroad shops, of course it is necessary to confine jobs of different kinds as near as possible to the same workmen, and, after arriving at what it costs by the day's work, it will be found that proper prices can be set for a majority of the different classes of repairs, both upon locomotives and cars. Particularly is this the case in reference to what is termed "general repairs."

W.

The Railroads of the United States in 1884.

From the introduction to the eighteenth annual issue of Poor's "Manual of the Railroads of the United States" we tabulate and copy as follows:

| | 1884. | 1883. | Inc. or Dec. | P. c. |
|-------------------------|-----------------|-----------------|--------------|-------|
| Miles railroad | 125,379 | 121,454 | + | 3.25 |
| Miles track | 156,497 | 149,183 | + | 4.9 |
| Miles steel track | 90,243 | 78,491 | + | 15.0 |
| Miles reporting capital | 125,152 | 120,552 | + | 3.8 |
| Capital stock | \$3,782,616,686 | \$3,708,960,583 | + | 1.9 |
| Funded debt | 3,699,115,772 | 3,500,879,914 | + | 5.7 |
| Other debt | 244,666,596 | 268,925,285 | - | 9.0 |
| Stock and debt | \$7,676,399,054 | \$7,477,865,782 | + | 2.7 |
| Cost | \$6,924,554,444 | \$6,684,759,445 | + | 3.6 |
| No. locomotives | 24,587 | 23,823 | + | 3.2 |
| No. passenger cars | 17,903 | 16,489 | + | 8.5 |
| Bag. mail and exp. cars | 5,011 | 5,048 | - | 0.7 |
| Freight cars | 798,390 | 738,661 | + | 8.1 |
| Miles worked | 113,173 | 106,839 | + | 5.8 |
| Pass.-miles | 8,778,581,061 | 8,541,309,674 | + | 2.7 |
| Ton-miles | 44,725,207,677 | 44,064,923,445 | + | 1.5 |
| Earnings: | | | | |
| Passenger | \$206,790,701 | \$206,837,256 | - | 0.02 |
| Freight | 502,869,910 | 544,509,831 | - | 7.7 |
| Other | 53,645,997 | 55,765,093 | - | 3.8 |
| Total earn. | \$763,306,608 | \$807,112,780 | - | 5.2 |
| Working exp. | 496,792,697 | 515,525,192 | - | 3.7 |
| Net earn. | \$266,513,911 | \$291,587,588 | - | 8.6 |
| Other income | 83,242,241 | 68,354,739 | + | 21.2 |
| Total income | \$349,756,152 | \$359,942,327 | - | 2.8 |
| T'l income | \$349,756,152 | \$359,942,327 | - | 2.8 |
| Payments for: | | | | |
| Bond interest | \$167,286,139 | ... | ... | ... |
| Other int'l. | 7,432,919 | ... | ... | ... |
| Total int'l | \$174,719,058 | \$171,414,258 | + | 1.9 |
| Dividends | 93,203,835 | 101,579,038 | - | 8.2 |
| Other (rentals) | 70,573,051 | ... | ... | ... |
| Total | \$338,495,944 | ... | ... | ... |
| Rate per mile: | | | | |
| Passenger | 2.356 cts. | 2.422 cts. | - | 2.7 |
| Ton freight | 1.124 " | 1.236 " | - | 9.0 |

Had the passenger rates of 1883 been maintained for 1884, the earnings from this source would have equaled \$212,617,233, a sum \$5,826,532 greater than that received.

Had the rates for 1883 been maintained for 1884, the earnings from freight would have been \$553,604,042 in place of \$502,869,910, the amount actually received. Had the rates of 1883 for the transportation of passengers and freights been maintained for 1884, the gross earnings of all the roads would have been \$827,525,371, exceeding by \$56,840,463 the amount actually received, and greater by \$3,752,447 than the earnings for 1883. It will thus be seen that the de-

cline in the earnings for the past year was due wholly to the reduction in rates charged.

Notwithstanding the great prostration of business which prevailed, the tonnage of merchandise distributed in 1884 fell very little short of that of 1883, while it exceeded the tonnage moved in 1882 by 29,583,374 tons. The service performed in 1884 in the transportation of freight was greater than that performed in 1882 by 5,422,998,428 tons moved one mile (13% per cent.).

The falling off of the earnings of the railroads of the country is something phenomenal, so far at least as their recent history is concerned. The total earnings of all the lines in operation equaled:

| | | | |
|---------|---------------|---------|---------------|
| In 1877 | \$472,509,272 | In 1881 | \$701,680,982 |
| " 1878 | 490,103,351 | " 1882 | 770,209,899 |
| " 1879 | 525,620,657 | " 1883 | 823,772,924 |
| " 1880 | 613,733,610 | " 1884 | 770,684,908 |

the increase in the period of six years equaled \$350,863,652; the ratio of increase for the same period being nearly 75 per cent. In four years, ending Dec. 31, 1883, the increase of earnings of all the roads equaled \$298,152,347, the average rate of increase being over \$75,000,000 annually. This vast increase was due very largely to the enormous expenditure in the period of five years ending with 1883 in the construction of railroads, within which about 40,000 miles of line were constructed at a cash cost of at least \$1,200,000,000. The expenditure was well distributed throughout the country, and gave an extraordinary impulse to trade and production of every kind. In 1884, only about 4,000 miles of new line were constructed, the cost of which did not exceed \$20,000,000, and perhaps not over \$15,000,000, per mile, or a gross sum of from \$60,000,000 to \$75,000,000. From such a decrease in an expenditure which in a single year, 1882, reached \$350,000,000, it was inevitable that a violent shock should be given to all the great interests of the country.

In a country like our own a check has frequently all the effect of a great disaster. The tonnage moved in 1883 by the railroads exceeded that of 1882 by 40,000,000 tons. At \$25 to the ton, the increase of value in one year of the tonnage moved equaled \$1,000,000,000. All the great interests of the country had not only extended their operations in like ratio, but in far greater ratio, under the expectation that 1884 would show an addition of 40,000,000 tons, having a value of \$1,000,000,000, to that moved the previous year. Instead of an increase in 1884, there was a falling off of 10,000,000 tons, having a value of over \$250,000,000. In consequence, almost every branch of production and trade was brought to what seemed a complete standstill. Such really was by no means the case. The volume of merchandise moved and distributed in 1884 very nearly equaled that of 1883, while consumption went on very nearly at the rate of the previous year. As provision had been made for an increase in 1884 equal to that of 1883, the result was a complete glut of every kind of products, hardly any one of which could be sold at a price that left any satisfactory profit to the producer.

Of the 40,000 miles of line built in the five years ending with 1883, no small part was built on speculation, and for that very reason paralleled already existing lines. The most striking examples of the kind, examples so often adduced, are the West Shore and "Nickel-Plate" lines. The general demoralization which has prevailed in railroad circles is due more to the construction of these two, and to the ill fortune which attended them, than to any other cause, or it may be said to all other causes. Their effect has been to stop altogether the payment of dividends which had been paid for a long time at high rates by the Lake Shore and Michigan Central, and to reduce those paid on the New York Central from 2 per cent. quarterly to one-half of 1 per cent. quarterly. The stoppage or reduction of dividends on these great lines created profound apprehension and distrust as to the value of all railroad properties. The earnings of other great trunk lines suffered in like manner if not to the same extent. A general disruption of the relations previously existing between the companies was the inevitable result. They seemed to be set wholly adrift without chart or compass. In the distrust and incoherence which prevailed, the various lines, especially the great trunk lines, struck out on their own account and bid wildly for business with very little reference to rates or to the result. Pools were dissolved almost as soon as they were entered into, as they always will be dissolved whenever there is not enough business to go round.

Although West Shore and "Nickel-Plate" seemed to be the occasion of the great catastrophe of 1883 and 1884, the real causes had been long at work in the wonderful success of signal instances of "watering," of which the Pacific lines, the New York Central and Lake Shore, are striking examples. The real catastrophe occurred when these waterings took place. Incited by their success, our whole people became wild upon the subject of railroad construction, believing that two or three dollars could easily be made for every dollar put up, either by the success of their ventures, or by the sale of their securities. In this mania or delusion the capitalist and the adventurer alike shared. The promoters of West Shore, men of capital, put up their money in good earnest under the idea that they were embarking in an honorable and meritorious enterprise. The promoters of "Nickel-Plate" built their line on speculation and for the purpose of selling it, securities being issued at the rate of two or three dollars for every dollar of cash paid. No small portion of the 40,000 miles constructed in the five years ending with 1883 was built upon the same plan and with the same object. Whatever their fate, a large number of them became competitors for a business for which ample provision had already been made by existing lines. Railroads, unfortunately, seem to reverse the rule of "the survival of the fittest," to "the survival of the unfittest." They can be used but for one purpose, and, when they go into the hands of receivers, they are to be run so long as the operating expenses can be paid. If the earnings are not sufficient for this purpose they are to be eked out by "receiver's certificates."

The country is now at about its lowest depth as far as railroads are concerned. The evil done, the remedy has now to be applied. It is not the case for the sponge. Non-competing lines must await the steady and certain increase of the general business of the country; the competing ones must be taken up by the lines they parallel and used as side tracks, or made servicable in some other manner as best they may. The process of recovery is already going on. We cannot long remain as we are. It is not consistent with the disposition or genius of our people to be always under the harrow. They have the gift of soon working their way out of the difficulties that surround them, no matter what these may be; and, from long experience, they are well trained in the very matter in hand. All that is now wanting to a vigorous and widely extended movement in the right direction is some striking example of success—a satisfactory solution of some one of the most knotty problems that beset them. Such an example seems likely to be set them in the speedy adjustment of the West Shore imbroglio. It now seems probable that this line must fall into the hands of the New York Central, in which it will at least be impotent for mischief as a rival line. With that disturbing element out of the way, the Central could well hope to resume dividends, certainly not on the scale of the past, but upon a scale satisfactory to the shareholders, who will feel a much keener delight in receiving dividends at the rate of 5 or 6 per cent. than they ever felt in receiving them

at the rate of 8 or 10 per cent. The solution of the West Shore problem means peace between the Central and the Pennsylvania companies. When these two great companies are on amicable terms, real and substantial progress will have been made toward a restoration of rates that will give to capital not what it once received, but a fair and satisfactory return. A composition between the Central and West Shore will soon be followed by compositions similar in kind between other great lines and their rivals that are now competent only for mischief. The weak will be disarmed, and the strong lines, left masters of the field, will gradually work out of their embarrassments and difficulties. If they cannot, in the rates of their dividends, repeat the past, they will be able to pay as much as money is likely to yield in the general investments of the country. It is to be remembered that the rates of interest paid by the railroad companies on their bonds equal 6, 7 and 8 per cent., 7 per cent. being a very common rate. These bonds are rapidly falling due. They will be replaced by bonds bearing interest at the rate of 3½, 4 or 5 per cent., the reduction in rates inuring wholly to the benefit of shareholders.

The chief sufferers by the recent decline of earnings have been the great trunk lines between Chicago and the seaboard, the decline with these being in part due to the large falling off in our exports of breadstuffs and provisions; the Union and Central Pacific, and the lines traversing the mining states and territories. The volume of tonnage of the Union Pacific has been well maintained, but its great apparent success for a time, was due to a monopoly of the business of its route which enabled it to charge nearly twice the average rates for the country. That monopoly is now well-nigh lost, and with it the rates once maintained. The managers of Central Pacific have destroyed the monopoly it once enjoyed as a through route, by constructing a rival line of their own in which their interests are now mainly concentrated. Mining, particularly of gold and silver, is at best a very uncertain business, and the railroads built to accommodate it are subject to similar extreme fluctuations.

The general volume of business in 1884 very nearly equaled that of 1883. In extensive sections, mainly free from the influences which have affected the lines described, the earnings in 1884 compare favorably with those for 1883. The earnings of the railroads in the New England group in 1884 were \$58,558,913, against \$59,155,763 for 1883, the falling off being only \$596,850. The earnings of the ten states comprising the Southern group were \$71,861,795 in 1884, against \$69,844,273 for 1883, the increase for the year being \$2,017,522. The earnings of the six great lines within the territory lying to the south and west of Lake Michigan were, in 1884, \$74,253,296, against \$75,564,744 in 1883, the decrease for the year being only \$1,311,448. The number of tons moved by these lines in 1884 was 32,573,518, against 31,663,979 in 1883. The rate per mile was 1.251 cents in 1884 against 1.308 cents in 1883. These lines were mainly free from the competition which so disastrously affected many Eastern ones, each of the former having a large local business of its own. With the exception of the class of roads referred to in the preceding paragraph, which embrace a comparatively limited number of lines, rates and business for 1883 were fairly maintained. With the recovery by the trunk lines of their business, which is not to be relatively on the scale of the past—a slow but certain process—the whole system will again assume something of its wonted prosperity. It is not to be forgotten that a great change has taken place the world over in the abundance of capital compared with that of former years. The rates for money, in this country at least, are to be very much less in the future than they have been in the past, so that a 5 per cent. investment will be looked upon as quite as desirable as was an 8 per cent. a few years ago.

It would seem natural, when the tide turned, that the expenditure of \$1,200,000,000 upon 4,000 miles of new line, in the period of five years ending with 1883, would have been followed by an extraordinary monetary stringency similar to that which followed the great movement in the five years ending with 1873, during which fully 27,000 miles of new line were constructed. At the close of the five years ending with 1873, the condition of the country was only a little short of bankruptcy, in which the banks and the great producing and commercial interests were alike involved. The earnings of our railroads which, in 1873, equaled \$536,419,935, fell off in 1874 to \$520,466,016; in 1875 to \$503,065,505; in 1876 to \$497,257,959, and in 1877 to \$472,909,272. It was not until 1878 that there were any indications of recovery, the railroad earnings for that year being \$490,103,351, an increase of \$17,194,079 from the previous one, the gross amount still being \$36,316,584 below those of 1873.

It is not necessary here to enter upon the causes of the long period of depression which followed 1873. Its most striking feature was the lack of money—of capital for carrying on the ordinary operations of the country. The most striking feature which so far has followed the period ending with 1883 has been the abundance of money—of capital. The railway movement ending with 1873 was a most exhaustive one. The labor of years of our people was then required to restore the waste and exhaustion that had been suffered. In the period which followed 1883, in the face of a recent expenditure of \$1,200,000,000 on new lines, capital has been far more abundant than at any previous period in our history, showing how much stronger the ground upon which it stood in the period following 1873. For the period of five years, ending with 1883, the earnings of railroads were excessively stimulated by the extraordinary amount of construction work, and when this stimulus was withdrawn there was an excessive falling off of earnings; the falling off in 1884 equaled \$52,988,016, or at the rate of 6.5 per cent. From 1873 to 1874, however, the earnings, which then had not received such extraordinary impulse, fell off to the extent of only \$5,953,919, or at the rate of 1.1 per cent. The decline in earnings from 1874 to 1875 was \$17,400,511, or nearly threefold greater than for the previous year, showing a much greater degree of depression for 1875 than for 1874. The earnings of the railroads for 1885 will not be much below those of 1884. There is every reason to believe that in 1885 railway earnings will reach their lowest ebb, and that in 1886 they will show a decided increase over those for the current year, or even those for 1884. The periods preceding and following 1873 and 1883 have many similar features, but they are wholly unlike in this, that in the period which preceded 1873, the capital of the country was thoroughly exhausted in the construction of 27,000 miles, and that the losses sustained had to be restored in the period that followed, which was one of great commercial and industrial depression and distress; while in the period which preceded 1883, capital steadily increased in abundance in face of the enormous expenditures that had been made, so that the period when it closed, instead of ending as did that closing in 1873 in a great crisis in which all interests were alike disastrously involved, closed with a capital greater in abundance than when it was entered upon. The evil, if it can be called such, under which the country now apparently labors, is a plethora not an absence of capital. The problem now before the people is not a restoration of the waste of the past, but some disposition of its vast accumulations.

Foreign Technical Notes.

Recent experience on the Wurtemberg State Railroad has shown that an iron cross tie with metal $\frac{1}{2}$ in. thick stood an ordinary derailment very well, without injury to gauge or any serious deformation, while sleepers in which the thickness of the main body had been reduced to $\frac{3}{4}$ in. with strengthening ribs, were so badly deformed by the same derailment as to need changing out.

In the *Organ for Railroad Progress*, of Wiesbaden, Herr Nevole, Chief Engineer of the Austrian State Railroad, has illustrated a hydraulic riveter, by which short sections of round iron are used instead of headed rivets. The rivet is set up on both sides of the joint plates at once by the simultaneous action of two riveting dies, one of them being held by a fork at such a distance from the plate as to insure the formation of equal heads on both ends of the rivet. It is claimed that this riveter saves 35 per cent. of the ordinary cost of hydraulic riveting; first, through the saving in first cost of rivets, and secondly and principally, by saving the man ordinarily employed in passing the rivets through from the back.

The Portland Ferry Transfer, Oregon Railway & Navigation Company.

Perhaps no other railway transfer of equal importance has been built in so difficult a position and in such a short space of time, as the one illustrated, across the Willamette River at Portland, Oregon. Determined upon late in the month of July, 1883, only about 30 days remained in which to prepare the plans and finish the work, so that it might be ready for a service which was no less important than to transfer across the Willamette River the seven trains of Pullman cars of the still well-remembered "Villard gold-spike excursion party," on their way over the Northern Pacific from St. Paul to Puget Sound.

Of course an order to build this transfer, emanating from so great a potentate as the President of the Northern Pacific Railroad Co., was not to be dallied with, especially as any failure to complete this one link would have prevented the execution of the grand scheme of taking this famous excursion party from the Atlantic to the Pacific over the Northern Pacific and its connecting line, the Oregon Railway & Navigation Co., without change of cars. Surveys and plans were at once begun, the place finally selected being the narrowest point of the Willamette River, there about 1,000 ft. wide, as shown on the map herewith.

The Willamette River has an average annual rise and fall from 20 to 25 ft., with an extreme of about 29 ft. It appeared necessary, therefore, to build inclines, with a track on which to run a carriage and apron to suit any stage of water. The inclines were designed as pile and timber trestles, timber above water and piles below. During the month in which the work was to be done the water was fortunately near its lowest stage. The inclines were both built double-track, as was also the transfer barge.

Surveys and soundings on the west or Portland side of the river showed a favorable bottom for piling, and its construction possessed no special interest. All of the work was done without the aid of divers.

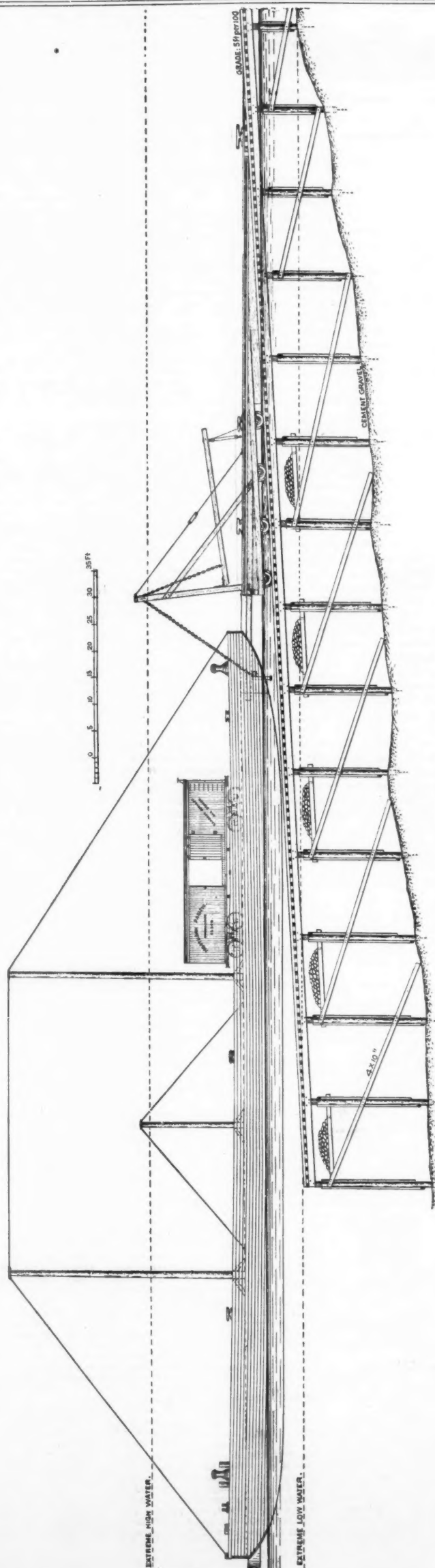
On the east side of the river, however, matters were very different. Above and below water the natural slope was very steep, as shown to scale in the engraving, and composed of an extremely hard cement gravel, so hard that it was absolutely impossible to force a pile into it without the best kind of a shoe, and even then a penetration of only two or three feet could be obtained with severe driving. The shoe used with best success was a cast-iron pot shoe, which weighed about 175 lbs., and had a 2-in. iron spike, 24 in. long, fastened in the bottom. A diagram of this shoe is shown. Other shoes were tried but did not give satisfaction. In some places this cement gravel stands with a vertical face above and below water 40 ft. high, and is so hard that even the action of water, year after year, has not made it crumble, or in fact made any impression on it whatever. In the railroad excavations near by blasting was resorted to in moving it. From these facts some idea may be formed of the difficulty of driving a pile into it on a slope.

Doubts were expressed about the stability of a structure on piles which had such slight penetration, but it seemed the only way to accomplish the desired result. It became necessary to stay each pile, before removing the driver, without which the piles would have fallen over from their own weight. As fast as each bent of piles was driven, or, more properly speaking, set up, they were placed in line with temporary clamps, above water, which clamps were also fastened to a temporary pile, driven at each end of the bent, to serve as guides and aid in placing the superstructure, after all other piles were cut off under water.

Three divers were employed to bolt on the sway braces under water. These divers were practiced in submarine work and prosecuted the work vigorously, working eight hours a day under water. They received \$2 for each hour's labor, the outfit being furnished by the company.

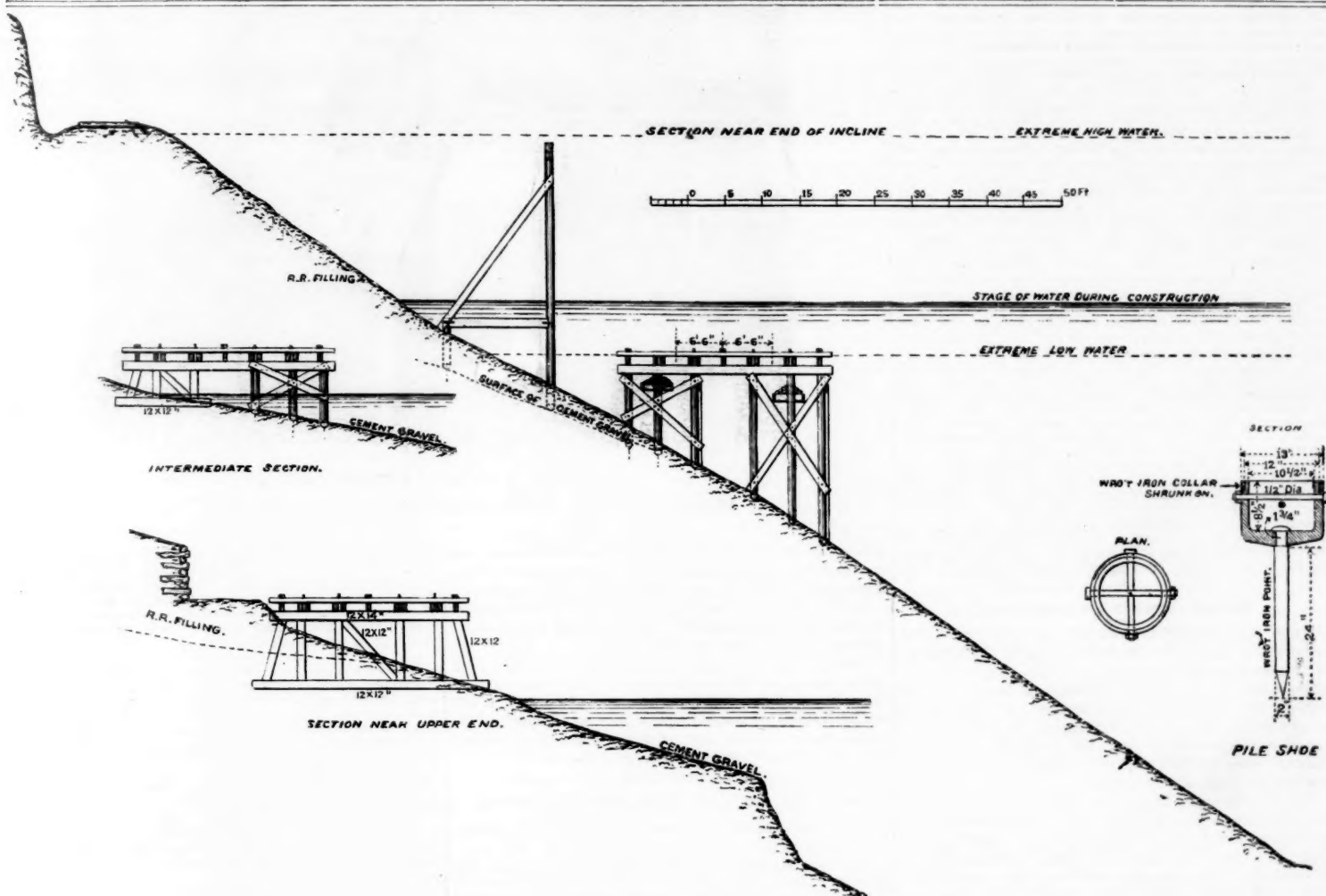
The length of each sway-brace having been determined by the engineer in charge, it was loaded with a piece of iron rail, fastened to the lower edges (which was detached by the diver when the brace was finally fastened in position), and then lowered at each end the proper amount to place it at the right angle. Permanent longitudinal bracing was also bolted on the sides of the bents by the divers, connecting all the bents together and preventing them from falling over before the stringers and track were laid.

After bracing, the piles were first cut off above water, 12 ft. above the elevation at which they were to be capped, to furnish a base upon which to run (by hand) the saw frame,



Side Elevation of Barge, Carriage and Lower End of Incline.

OREGON RAILWAY & NAVIGATION CO. CAR TRANSFER, PORTLAND, OREGON.



OREGON RAILWAY & NAVIGATION CO. CAR TRANSFER, PORTLAND OREGON.

which at the lower end of the incline cut off the piles 12 ft. below the water surface. Weight boxes, with side pieces extending at each end to rest on sway-braces, were made and set by the divers. These were filled with stone, sufficient in amount to overcome the buoyancy of the piles and caps.

The piles of each bent were then cut off at the right elevation and carefully located, by forcing down on them a straight-edge flat-ways, and marking the sides of each pile on it, by feeling with a pointed iron rod. From this template the caps were bored, and with the drift-bolts started, were forced down, without the aid of a diver, by the following method:

Pieces of scantling were fastened vertically to the cap, which reached well above the temporary clamp before mentioned, and a pair of 6-in. blocks rigged, one block fastened at the upper end of these scantlings, and the other to the temporary clamp. When this tackle was set up it forced the cap down into the water, between two guides at each end of the cap, to a firm bearing on the piles. These guides were of $\frac{3}{4}$ -in. round iron, with sharp points, which were carefully placed by feeling at the outer sides of the end piles. The drift-bolts were driven from above with a $1\frac{1}{4}$ -in. octagon steel drive-bar, with a socket-head on the lower end to go over the heads of the drift-bolts. The stringers were framed and floated over the caps and bolted, after which the ties were placed and spiked. The track and guard timbers were then put in position, the whole forming a long raft, which was nearly submerged with railroad iron and finally sunk to

the caps by loading a few push cars with rails and allowing them to run down the incline, and fastened by driving each prepared drift-bolt home. The extreme length of each incline when finished was about 900 ft.

The progress of the work presented many very busy scenes; the novelty of the diving operations drawing many spectators. Only one accident occurred to the divers, which might have been attended with serious results. The attendant of one of the divers, in screwing on his helmet, crossed the threads, stupidly thinking it was all right. The diver descended and presently signaled to be drawn up. His attendant failed to recognize the signal, thinking it one of the frequent jerkings caused by the diver at his work, and only by the watchfulness of the foreman was something wrong discovered. He, standing near, noticed, through the transparent water, the diver struggling to reach a staging rope. He pulled him up at once, and found his suit full of water to the chin. The next time the diver went down, he had a new attendant.

The testing of the incline was watched with much interest. Two heavy locomotives were first run down the in-shore track and then on the outer track. Not a shake or movement of any kind was observed, and it was believed the divers had faithfully done their work, on which the stability of the whole structure depended. Those who were posted about the bottom of the river knew that any serious defect in the structure would have landed those locomotives in 80 ft. of water, at the foot of the steep cement-gravel slope.

The transfer boat was a large barge remodeled to suit the demands of the case while the inclines were being prepared. Two tracks were laid its entire length, capable of holding ten freight cars or six first-class passenger coaches. It is moved from one side of the river to the other by a stern-wheel steamer, lashed to its outer end.

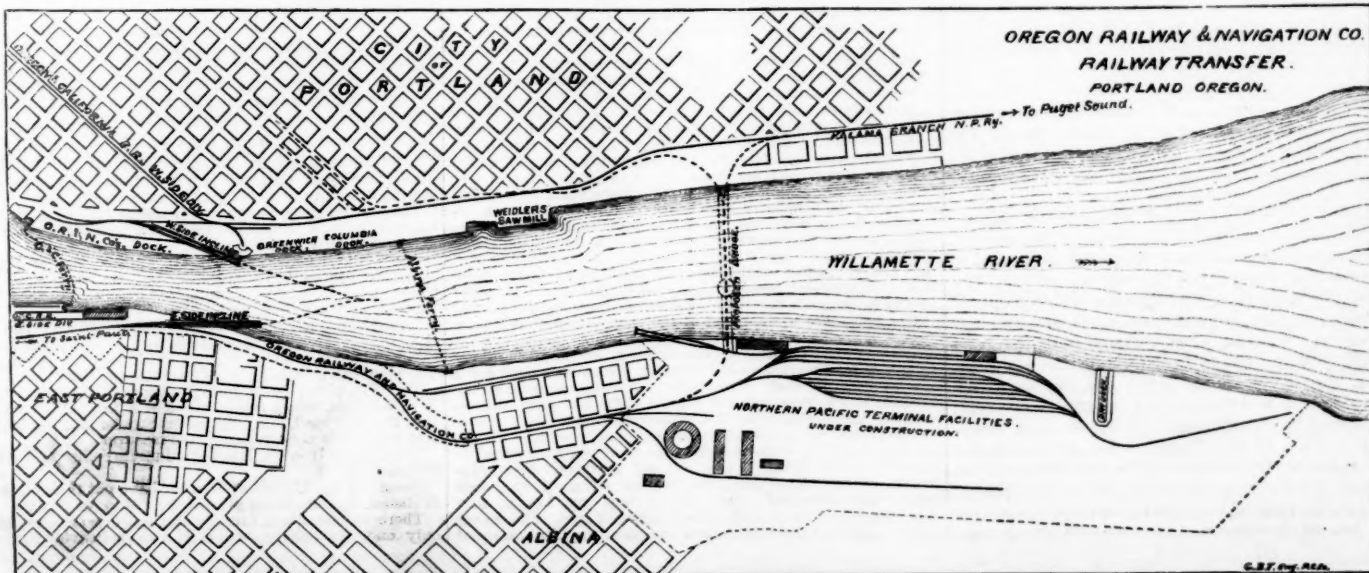
The carriages and aprons were built as shown by the elevation, being moved up or down the inclines by a locomotive. Had more time been allowed in which to study the subject, changes might have been made in the details of the structure which would have improved it.

Great energy was displayed by all concerned, and no disappointment awaited the excursion party, which soon arrived, and was quickly transferred to the other shore.

The Origin of the Chicago, Burlington & Quincy.

A correspondent of the Chicago Tribune from Galesburg, Ill., speaking of the late Mr. Colton, says:

The part which the late Hon. Chauncey S. Colton had in originating the Chicago, Burlington & Quincy Railroad system forms an interesting and the chief chapter in his life. As early as September, 1849, a charter was granted to build the Peoria & Oquawka Railroad, and finally the company decided to so build the line that Galesburg was left to the north. To offset the injury which this would do Galesburg's prospects in those days of no railroads, a number of energetic business men here at once formed a company, known as the Central Military Tract Railway Co., and a charter was secured to construct a road from Galesburg to some point on the Chicago & Rock Island line. Of this com-



pany Mr. Colton was an active and prominent member. At his personal solicitation the charter was subsequently so amended as to give the company the right to connect with any road leading to Chicago. About this time there occurred a chance, indeed almost providential, meeting of three men in Chicago—United States Senator Grimes, of Iowa, a director of the Peoria & Oquawka Railroad; Mr. Wadsworth, of Chicago, interested in the Chicago & Aurora line, which was about to be extended, and Mr. Colton, of the Military Tract. Mr. Colton proposed a union of all three lines, the Peoria & Oquawka to come to Galesburg, the Military to go to Mendota, and the Chicago and Aurora to Mendota, thus making one grand line. The plan seemed feasible to all, and, as a result of this chance conference, Senator Grimes was sent East to confer with capitalists interested in the Michigan Central. These capitalists proposed to build the road from Mendota to Galesburg provided the people along the route would subscribe \$300,000. It was found, however, that people were loath to put money in the enterprise, because the Military Tract Co., under whose charter the railroad was to be built, had been organized under a general law giving the Legislature power to fix the rates of transportation and fares, thus taking control of the road in these particulars from the company's hands. Mr. Colton was hurried to Springfield to secure the granting of a new charter, prepared by the Hon. W. S. Gale, of this city, obviating the objections named. The securing of the grant was a hard task, but was finally accomplished by Mr. Colton, who spiritedly remarked to the Legislature: You have your choice—the new charter and the railroad or the old charter and no railroad. This gave a new impetus to the enterprise, although great difficulty was experienced in raising the \$300,000. After canvassing every precinct between here and Mendota, there was still \$50,000 wanting. To make good this deficiency Mr. Colton and the Hon. Silas Willard each subscribed \$25,000, mortgaging their property to secure the money. Thus the guarantees were furnished and the road built. For 20 years Mr. Colton served as a member of the board of directors of the Chicago, Burlington & Quincy—the only one representing the West. In 1875 he resigned, owing to old age.

Magneto-Electric Crossing Signal.

A new application of electricity to railroad signaling has recently been made by the Pennsylvania Steel Co., of Steelton, Pa., in the apparatus illustrated herewith, for sounding an automatic alarm at highway crossings on the approach of trains or for announcing trains at stations. It is intended to act as a substitute for gates and flagmen at many less important crossings, and to "guard the guards themselves" at crossings where they are employed, by giving both the flagman and the public timely warning.

The accompanying illustration shows the arrangement used on a single-track railroad, which is so arranged as to be operated only by trains approaching the crossing (i. e., in the form illustrated, from the right). A similar box on the other side of the crossing is used for trains approaching in the other direction. Two plates, connected by a link and pivoted, are placed alongside of one rail, close enough to it to be depressed by the treads of the wheels. By another link one of the plates, called the rock plate (the one to the right) is connected to a rock shaft, which extends through a strong bearing into the heavy iron case or box shown, at a suitable distance from the rail, within which the electric generator is placed: the whole being mounted and secured upon the ends of two long ties framed to receive it.

The action of this rock plate is peculiar. It is pivoted at the rear end, not to a fixed point, but to a short crank-arm, the bearing for which is inclosed in the small box shown. As the first wheel of a train which is approaching in the desired direction (from the right in the engraving) touches it, it will be seen that it must not only depress it, but produce a slight forward motion, causing a corresponding rotary motion in the rock shaft which actuates the apparatus. On the other hand, when a train is approaching from the other direction, or has already passed the crossing, its wheels strike first the curved plate to the left of the illustration, and by means of the peculiar link connections shown depress the rock plate so as to clear the wheels before the wheels touch it, but the depression is directly vertical, so that it does not give any horizontal motion to it which would have the effect of actuating the rock shaft. Consequently, trains pass over the apparatus in one direction without having any effect upon it whatever, the different point at which the same force is applied to the rock plate giving the latter an entirely different motion.

The slight rotary motion which is in this way communicated to the rock shaft, when a train is approaching in the right direction, compresses a spring inside the case. As each wheel passes off the rock plate the reaction of the spring throws it up again to its former position, giving additional speed to the gearing within, which is set in motion at the passage of the first wheel, and operates the electric "generator." A small but heavy fly-wheel is connected with the apparatus, the top of which is just visible in the engraving, which serves to store up power to run the "generator," which is nothing more than a small dynamo, for the necessary number of seconds after the rear of the train has passed. The dynamo dispenses with all need for batteries, and reduces the work of maintenance to occasionally refilling the oil-cups and noticing if any part has been broken.

A suitable wire circuit is provided, commencing at the generator with insulated and protected wire, and continued with ordinary telegraph wire, leading to the electric gong, Fig. 2, which rings as long as the armature revolves. It is a simple matter so to proportion the mechanism for the required distance and speed that the revolutions of the armature and the ringing of the gong shall continue until the train reaches the crossing, and as each wheel acts upon the apparatus, the more wheels there are in the train the longer the bell will ring, a very convenient property, since the slowest trains have nearly always the most wheels. The practical limits to the ringing of the gong are that it will stop sounding after the head of the train has passed the crossing and before or very soon after the rear has passed. A "wild" engine running very slowly might not actuate the signal as long as was desirable, but even then, it is not un-

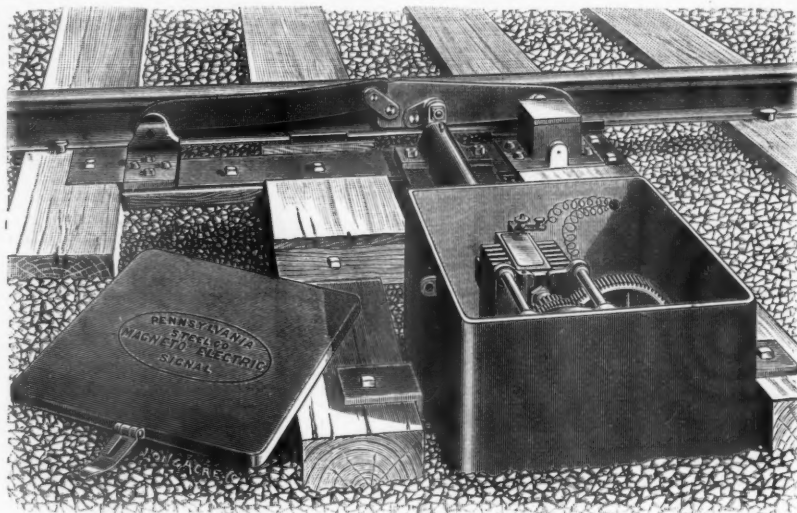


Fig 1—Actuating Apparatus.

MAGNETO-ELECTRIC CROSSING SIGNAL—PENNSYLVANIA STEEL CO.

reasonably claimed, the warning would probably last long enough for all practical requirements, as a team approaching a crossing at 8 miles per hour takes 42 seconds to go 500 ft.

All the bearings of any importance are self-lubricated by oil cups, the whole apparatus being designed to require inspection not more than once a month.

The iron case when shut is water-tight, and when duly locked cannot be maliciously tampered with without breaking open the case; so that, the manufacturers claim, it will not be essential to examine it more than once a month. The parts outside the case are all strong and heavy, and not likely to get out of order, while easily inspected.

How "They Do These Things Better in France."

A French commercial newspaper, *l'Informateur Commercial*, says, July 4:

The financial situation of our railroads is very bad, and deserves to receive all possible attention before it is too late. The securities of the great companies preserve an apparent firmness, which is apparent only, because it depends solely on the government guarantee. * * * The industrial and commercial crisis has evidently had a bad effect in earnings, though not in proportion to the reduction of exports and imports. Other reasons, therefore, must be sought for the languishing condition of the railroads. The three most striking are: (1) The Freycinet contracts [for an immense but gradual extension of the French railroad system]; (2), the lack of practical men in the companies' managements, having knowledge of commercial and economic matters; (3),

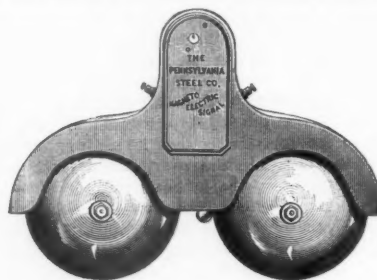


Fig 2—Electric Signal Gong.

rates founded on illusory "averages," not answering the necessities of the case.

When Mr. Freycinet conceived the idea of endowing France with numerous supplementary lines designed to connect the great routes with each other, or give the districts ill provided with communications access to the great lines, he evidently did not appreciate the extent of the task which he undertook. The state, not having the means necessary to construct all these lines, made contracts with the companies, which took upon themselves to carry out the scheme. But all these works have absorbed the companies' funds, and now, who pays the deficit? The state! This mends the matter finely. By this means the cost is a little greater, that is all.

Moreover, we must not forget that the operation of a line should be a business matter first of all, and therefore a company needs business men rather than engineers to manage its outside affairs. Yet the graduates of the Polytechnic School take possession of the technical departments; nothing could be better, and we are glad to see their labor thus rewarded; but, that questions as to rates, transportation, should be decided by engineers, we shall never admit.

The engineer usually has the anti-commercial spirit, and considers the business man and the merchant as an inferior being who has no right to complain, and who ought to accept whatever conditions the company may impose. Moreover, the interests of the companies being closely allied with those of the state, every time that commerce presents any demand, the company profits by it to ask for some concessions from the state; and if the concession is not granted, the company replies that it cannot grant what commerce requires. For instance, some months ago the Creusot Works wrote a letter to the Paris, Lyons & Mediterranean Railroad, in which it asked for a special rate on coal. The letter not being answered, the Creusot Works repeated the request. The company still remaining silent, Schneider & Co. (proprietors of the Creusot Works) made an agreement with a large company for the construction of barges enough to do their work, agreeing to forfeit 100,000 francs if they did not carry out their contract. After some time the general office of the railroad was informed that there was no longer any coal going over the road for the Creusot Works. This made a stir; inquiries were made, and the company sent an agent

to ask the Creusot Works if what it had been told was true. These works were a good customer which deserved to be cultivated, and so, after reciprocal explanations, the Paris, Lyons & Mediterranean Railroad granted the Creusot Works what it had asked for several months before, and paid it the 100,000 francs forfeit to the large company for the breaking of the contract.

In order to make rates well, it is absolutely necessary to be acquainted with the articles to which they apply, their markets, the competition with similar foreign productions to which they are exposed. When one knows nothing about them, he ought at least to seek for information; but to ask for information is considered humiliating by these railroad men, and they prefer, led by foolish pride, to give free swing to their ignorance.

TECHNICAL.

Locomotive Building.

The Mason Machine Co. in Taunton, Mass., recently delivered 3 new freight engines with 17 by 24 in. cylinders to the New Brunswick Railway.

The Chicago, Rock Island & Pacific shops in Chicago, Ill., have recently completed 7 new passenger engines for the road. They have 17 by 24 in. cylinders and driving wheels 66 in. in diameter. The boilers are 54 in. diameter of barrel and the fire-box is 60 in. long. The fuel to be used is bituminous coal.

The Taunton Locomotive Works in Taunton, Mass., are building 4 locomotives for the Old Colony road.

The Hinckley Locomotive Co. in Boston recently shipped a new locomotive to the St. Croix & Penobscot road.

The Baldwin Locomotive Works are building 2 freight engines for the Savannah, Florida & Western and 5 heavy mogul engines for the Gulf, Colorado & Santa Fe.

Mr. F. W. Richardson, of Troy, N. Y., has just filled an order for balanced slide-valves of his pattern for 36 locomotives under construction at the Rogers Locomotive Works, and 2 at the Baldwin Locomotive Works. He also recently received an order from the Director General of the Italian Government Railways for a set of his balanced valves for one of the locomotives in use on those roads as a test.

The Car Shops.

The Barney & Smith Manufacturing Co. in Dayton, O., is building 18 passenger and baggage cars for the Minnesota & Northwestern road; 1 sleeping and 3 parlor cars for the New York Central Sleeping Car Co., and 4 passenger cars for the Gulf, Colorado & Santa Fe. The company is also building 20 palace horse cars for Arms & Co.; 30 box cars for the Portage Straw Board Co., and has a number of small orders to be filled.

The Wilmington & Weldon shops in Wilmington, N. C., have lately completed 4 passenger cars for the road.

A meeting of the creditors of the Blaine Brothers Car Works, in Huntington Pa., was held recently, at which most of the bondholders were represented. A resolution was passed authorizing the trustee to take the necessary steps to have the property sold and to vest the interest in the bondholders. It is probable that the works will be sold in September.

The shops of the Central Railroad of Georgia in Macon, Ga., have recently completed several passenger cars to be used on the Atlanta & West Point road.

The Gulf, Colorado & Santa Fe Co. has given out an order for 400 box and flat cars.

Bridge Notes.

The King Iron Bridge Co. in Cleveland, O., has taken a contract for building an iron bridge over the Allegheny River at Brady's Bend, Pa., for the East Brady Bridge Co. The bridge will have 4 spans, 3 of 200 ft. each and 1 of 162 ft., and will have a roadway 20 ft. clear width.

Iron and Steel.

The Washburn & Moen Manufacturing Co., in Worcester, Mass., have just completed a new building 100 by 60 ft. for the manufacture of steel for their own use.

The Geddes Blast Furnace in Syracuse, N. Y., is to go into blast about Sept. 1, and the furnace is now being put in order and made ready to start.

The Pennsylvania Steel Co., at Steelton, Pa., is now prepared to furnish splice-bars of steel for rails of any size. These steel splices, it is claimed, will be much superior to any that can be made from iron.

The Washington Steel Works, in Reading, Pa., have just completed a plant for the manufacture of open-hearth steel, and will be prepared to furnish steel castings of any size. The plant has a capacity of 10,000 lbs. per day.

The Wilson-Snyder Manufacturing Co. has been organized in Pittsburgh, with a capital stock of \$100,000, to manufacture iron and steel. Mr. Augustus Snyder is President, and Robert J. Wilson Secretary and Treasurer.

The Goshen Iron Co. has started up its rolling mill at New Philadelphia, O.

Messrs. King, Gilbert & Warner have put their furnace at Wellston, O., into blast, after a short stop for repairs.

There is one blast furnace in the United States, and the only one, we believe, which is run exclusively by convict

labor. It is known as the Alcalde furnace, and is located at the Texas State Penitentiary, at Rusk, Tex. It is a charcoal furnace and has only a small output.

The extensive mills of Brown, Bunnell & Co. at Youngstown, O., which have been idle since June 1, will shortly be started up. The receivers have come to terms with the employees.

The Midland blast furnace, in Crawford County, made 1,203 tons of iron in June, and is still keeping up a maximum production. The Sligo, in Dent County, is reported working slowly, and will probably close down inside of two months. These are the only charcoal furnaces in the state in operation, and one of the two Missouri furnaces in South St. Louis, is the only coke furnace active. For the six months ending with June last the total production of pig-iron in Missouri was 18,505 tons, of which about one-third, or 6,358 tons, were of coke furnace make. In the corresponding period of last year the aggregate of pig iron made in the state was 17,922 tons; in the second half of the same year 42,421 tons. —*St. Louis Age of Steel.*

Manufacturing and Business.

The Hunter Railroad Car & Equipment Co., in Detroit, is extensively engaged in the manufacture of the Hunter improved car journal box cover, recently patented by Mr. Robert Hunter. The company claims many advantages for this journal box lid, including convenience in use and perfection in work, the cover protecting the box entirely from dust, and not being liable to work loose. The company offers to furnish the journal box for trial to any company desiring it. The Hunter Car & Equipment Co. also manufactures the Walker patent stencil for lettering freight cars and general design work, which has been tested successfully in several shops.

Mr. C. L. Cooke, whose office is at No. 28 Kennedy street, Syracuse, N. Y., has been appointed General Agent in the United States for the Railway Safety Appliance Co., of Montreal. This company manufactures Baker's automatic safety switch stand, which is patented both in Canada and the United States, and for which durability, simplicity and cheapness are claimed. This stand is used chiefly in connection with the Cooke safety switch, and has been adopted by the Canadian Pacific and several other roads.

The Smith & Owen Heater Co., in Detroit Mich., manufacture the Peter Smith car heater, which is a hot-water heater, arranged in such a manner as to combine the shell and coil principle. The outer shell or boiler is made of the best boiler iron and the coil or tubes of equally good material, and it is claimed that the heater cannot be injured or broken in case of accident to the car. The water is first heated in the outer shell or boiler surrounding the fire; then passes through the coil in the firebox; then to the circulating drum, and through the pipes or radiators, which heat the car, returning to the shell to be reheated, the arrangement of the pipes producing a rapid circulation. The makers claim that this heater is durable, safe, easily managed, and costs but little for repairs.

The Rail Market.

Steel Rails.—The market is steady, and quotations for moderate lots continue at \$27@27.50 per ton at mill. Three or four lots varying from 5,000 to 10,000 tons have been placed at prices which are understood to net the mills under \$27. Most of the makers are, however, so well supplied with orders that they are not inclined to shade prices unless for an unusually desirable order. Light rails are not in much demand now, but are still quoted at \$29@31, according to sections.

Rail Fastenings.—A little better market is reported, although demand is still very light, and sales are made chiefly on private terms, and quotations continue nominally unchanged at 1.90 cents per lb. for spikes in Pittsburgh; 2.40@2.60 for track-bolts and 1.60@1.70 for splice-bars.

Old Rails.—The market is very dull, and prices are declining under the influence of large supply and light demand. Quotations vary according to quality from \$16@17.50 per ton at tidewater. Old steel rails are still quoted at \$16@17 per ton in Pittsburgh.

The Pintsch Gas Light for Cars.

Mr. J. B. Gardiner, Superintendent of the New York, Providence & Boston road, makes the following statement in respect to the use of the Pintsch system on that road, in response to a request from the company:

"I beg to acknowledge receipt of your favor of July 14 desiring information as to working of the lamps and lights that were put into the reclining chair cars, which have the platform gas lamps also.

"The cars referred to were put into the Stonington Line May 11, to run between Boston and Stonington on our night trains. The gas light and lamps, both in the cars and on the foot-boards, have worked very satisfactorily. The cars are so well lighted that passengers can see to read in any part of them as well as at mid-day. We like the foot-board lights very much, as we have foot-board side gates, and with this light passengers can pass from one car to the other with perfect safety and with as little apparent danger as though the car were at rest.

"As to a comparison of the gas light with that from oil, I would say, in my judgment, there can be no comparison for cleanliness and safety. The popularity of the light is more pronounced daily. We are so situated that a comparison between oil and gas is easily observable, and in several of our trains we burn both oil and gas in drawing-room cars on the same train, and the brilliancy and mellowness of the gas light is very marked when compared with the oil light. Our steamboat trains running through Providence half an hour apart furnish one of the best testimonials possible in favor of your light, our first train being entirely lighted with oil and the second train entirely with gas. The appearance of the two trains as regards light admits of no comparison. For cleanliness, brilliancy, economy and for general satisfaction I can cheerfully recommend your light."

Trial of a Safety Car Truck.

A test was recently made on the Canadian Pacific road near Montreal of a new safety appliance, patented by S. Davis & Son. The object is to prevent cars from leaving the road-bed in the case of a break in the track. The invention consists of a connection by rods between the truck-frame and the body of the car, which is intended to take the place of the check-chains now in use and to serve their purpose more effectually in keeping the truck in line with track. The tests at Montreal were made by running cars provided with the Davis safety appliance over a point where two rails had been removed from the track, and it appeared to have been very successful. The cars were run upon the break at considerable speed, and in every case the trucks were retained in their proper position, and no serious consequence resulted. In one instance the truck ran along on the ties and took the track at the end of the break as if nothing had happened.

The Wooten Locomotive Fire-box.

A consolidation locomotive belonging to the Philadelphia & Reading Co., and provided with the Wooten fire-box, has been in use for two months past on the Union Pacific road, hauling freight over the heavy grades between Green River and Laramie. The engine has recently been sent from the Union Pacific to the Atchison, Topeka & Santa Fe, where

it is to be used for a time on the heavy grades over the Raton Mountains in New Mexico. The object of sending the engine West was to give the Wooten fire-box a practical test in burning the waste from the bituminous coal mines of Wyoming and Colorado.

The Rand Air Compressor.

The Lake Superior Iron Co., having recently had occasion to renew a portion of the foundation of the 16 by 30 in. Rand air compressor, purchased by it from the Rand Drill Co. in 1878, advantage was taken of this opportunity to make a careful examination of the machinery, in order that any needed repairs might be put on it. The engine, however, was found to be in perfect order, requiring no work except to set out the piston rings. The brass air cylinder showed but slight wear. As this cylinder had never been counterbored at the ends, it was thought best to do so at this time, but beyond this and a slight change in the introduction of water to the cylinder-heads, no work has been put on the machine during the 6½ years in which it has been in constant use.

The Rand Co. was awarded at the New Orleans Exposition first-class gold medals for reciprocating rock drills and duplex air compressors.

A Rotary Locomotive Engine.

Messrs. A. L. Harris and W. C. Shearer, of Atlanta, Ga., have taken out a patent for an entirely new style of locomotive. The boiler truck, driving-wheel, etc., are of the usual pattern, but the motive power is furnished by a rotary engine connected directly with the main driving axle, or, if desired, 2 rotary engines can be used. The engine, it is claimed, is so arranged as to be easily reversed, and can be handled without any more difficulty than one of the ordinary pattern.

English Laminated Springs.

According to the estimate of Mr. Hansell, the quantity of laminated springs at present in use on English, Scotch and Welsh railways is 231,920 tons, and there are used annually nearly 12,000 tons, Sheffield makers producing about 10,000 tons.

Locomotive bearing springs vary in length from 36 to 54 in., ten ½ in. plates, 5 in. wide being used in the latter size. An ordinary passenger coach has four or six springs 84 in. long, with ten to thirteen plates ½ in. to ¾ in. thick and 3½ in. wide. A freight wagon has usually four springs 36 in. long, with fourteen plates ¾ in. thick. The amount of steel used is thus in excess of that used in America for the same load.

The Foster Compressed Gas System.

One of the parlor cars of the New Haven road, fitted up with the Foster compressed gas system, is upon exhibition at the Boston & Albany station. In the operation of the system gas is made from crude petroleum or naphtha, and then compressed into storage tanks at the terminal stations, from which it is transferred by patented appliances into the reservoir placed under each car. A governor of ingenious construction is placed in the car closet, through which all the gas passes, by which means the supply at the burner remains the same, regardless of the variation of pressure in the supply tank. In this closet is also placed a gauge which registers the pressure in the cylinder. The cylinders on the car exhibited are 15 in. in diameter by 10 ft. long, and when fully charged will contain 450 cubic feet. Ordinarily, three of the new style lamps would light a car sufficient for all practical purposes, and as they each consume but three cubic feet per hour, this sized cylinder would light a car about 50 hours, at a cost of less than 2 cents per hour. The lamps used are something entirely new; they are regenerative in principle, the products of combustion being used to heat the gas and air to a very high degree before they reach the point of combustion; the result is a clear, white and intense light, as steady as an incandescent electric, which it somewhat resembles in appearance; it gives forth no shadow, as there is nothing but a glass globe between the light and floor. Added to this there is an ingenious arrangement for carrying off the vitiated air in the car by the aid of the heat generated in the lamps. The Foster system is in use on the Queen and Crescent route, and on the Pennsylvania. It has also been adopted by the Mann Boudoir Car Co., who also use the gas for cooking purposes. —*Boston Traveler.*

Steam Motors on Street Railroads.

The city council of Concord, N. H., has authorized the use of steam motors on the street railroad running from Concord to the suburban village of Penacook. There is much opposition to this action, and the remonstrants threaten to appeal to the court for an injunction. The parties opposed to the use of steam stated that in all cities where steam motors had been tried their use has been discontinued. The principal reason they claim is that they frighten horses.

This statement on the part of the remonstrants is not altogether correct, however. Steam engines have been used for a number of years in New York, and their use does not appear to disturb the horses at all, although they are run on some of the most crowded streets in the city, hauling freight cars from the Thirtieth street station of the New York Central & Hudson River road to the down-town freight stations.

The Coming Explosion at Flood Rock.

At some date in October next, not yet fixed, the works for removing Flood Rock, in progress for the past ten years, will be exploded, the work of loading the 13,700 holes having just begun. It will be by far the vastest explosion which has ever taken place, 225,000 lbs. of "rackarock" powder and 75,000 lbs. of No. 1 dynamite being employed, or over six times as much as was exploded at Hell Gate in 1875 (49,900 lbs.). The holes are about 9 ft. by 3 in. diameter, at an angle of 35 to 40 degrees with the vertical and chiefly in the rock instead of (as at Hell Gate) in the pillars of the 21,670 ft. of galleries which have been constructed under an area of about nine acres. Making these galleries has involved the removal of 80,160 cubic yards, from which it follows that the average section of the galleries is a little over 4 by 8 ft. The average thickness of the rock above the galleries is about 13 ft., which makes the quantity of rock to be broken up and removed, after the explosion by dredging, fully 200,000 cubic yards.

That so new an explosive as "rackarock" should be chosen for such a work in preference to nitro-glycerine compounds is a great testimonial to its qualities. It is not generally known that the mysterious "solid ingredient" of rackarock is simply chlorate of potash, and the "liquid ingredient" di-nitro-benzole, a product of the distillation of coal tar, as these easily-ascertained facts have, for some reason, been "kept quiet," so far as possible, in all notices of the explosive.

THE SCRAP HEAP.

Pathfinders.

"How far is it to Fitchburg?" asked the parson. "Twenty-five miles," said the brakeman promptly. "Why, you just told me 50," shouted the cross passenger. "That's all right," said the brakeman—"50 for you, 25 for him. He goes half fare."

The platform at Lacton was covered with milk-cans. "Dear me!" said the woman with the bird-cage. "Where did all this milk come from?" "It came down," said the rear

brakeman, winking at the semaphore. "on the the last rain." And the woman said "Oh!" and that she didn't know they had a milk-train on that road.

"We're not making time this morning, are we, conductor?" asked the impatient man with the sample cases. "Well, I should say so. We made 75 minutes the first hour out, 98 the second, and" (looking at his watch) "we're going to crowd all the rest of the morning into this hour unless somebody can build a bridge by a miracle. How much time do you want us to make on a short run? All eternity?"

"Pinchbar, the spare man that's been doin' night shift in P. & O. yards got slugged last night," said the fireman, dropping on the bench, and looking around to see where the signal-man kept his tobacco. "How's that?" asked the signal-man, as he enticed a farmer on the track, and then waved 97 to back down fast. "Went to throw couple of empties over on elevator siding, and car-load of ties run down on 7 and hit him." "Kill him?" asked the signal-man, looking to see if the farmer's team missed any of the tree-boxes on its runaway down the street. "Course," replied the fireman, lighting on the tobacco; "killed him on sight; he didn't know it was loaded." And in an abstracted way he loaded his pipe, filled his pouch, and put the rest of the tobacco in his pocket. —*Burdette in Pathfinder Railway Guide.*

Newspaper Railroading.

The blunders made by newspaper reporters in railroad matters are proverbial, but we have seen nothing before quite so mixed up as a dispatch recently published to the effect that a line "had the advantage of being of the sort known among railroads as an 'Air Line' or nearly so, not a single maximum grade occurring, etc."

Exactly what the term "Air Line" has to do with grades or how any line can be constructed without a "maximum grade" it will puzzle those who are "among railroads" to understand. —*Official Railway Guide.*

An Innocent Inventor.

A correspondent of an English exchange gives the following specification attached to an application actually on file in the English patent office:

"Having unreservedly, fully, and as accurately and as clearly as I possibly could (and indeed, can, for time will not allow a revision, this being the 29th day of January and my provisional protection expires on the 31st), therefore I trust that my apparent inaccuracies of description or technical defects will be construed as liberally as each respective case will admit. I will now state as briefly as I can what I know as to the novelty of my invention as hereinbefore specified. I first became aware of the purifying qualities of charcoal some 20 years ago in the course of my readings and practice as an operative chemist, but it never occurred to me to apply it to the purification of water until the early part of last summer when I at once gave my whole soul to the subject and have continued incessantly to pursue it with all my energy during eight months, strengthened by the hearty and efficient co-operation of my dear wife the support of our brother Sampson, the enthusiastic admiration of our dear friend Mr. Robert Noyes, and our brother-in-law Mr. William Need, the cheerful assistance of our several women, particularly Martha Heath and Betsy Jebbs, and the warm smile of an enchanted public; particularly the dear little ones who clasp the cold sparkling crystal with both their tiny hands and lifted it to their sweet little quivering lips. To some this may seem irrelevant, but I feel it a tribute of justice which gives me inexpressible pleasure to render, for without such aids it would have been a physical impossibility for me to have brought my invention to a successful issue. Although I did not suppose when I commenced to apply carbon to the purification of water that there was any novelty in the thing, but I felt that whatever efforts there may have been made, they had not resulted in the production of an efficient water and air purifier. I know now what I did not know then, that impure charcoal have been and still is used as a water filter, but beyond that fact I am not aware of any other virgins upon my invention. I have experimented upon every substance and material likely to answer my purpose, and have combined and arranged them in every imaginable mode, until I am so far satisfied with my researches that I have no desire for any addition or change. Whatever the invention in regard to novelty may be to others, it is all new to me with the sole exception hereinbefore stated, that impure charcoal has been and still is used as a filter."

Train Wrecking by Dynamite.

A dispatch from Denver, Col., July 31, says: "The incoming Leadville passenger train, due here at 9:30 this evening, exploded a dynamite cartridge about 2½ miles south of the city. The engine and tender were badly wrecked, one length of track torn up, but the passengers were uninjured. The explosion was distinctly heard in a radius of 10 miles. The popular belief is that the outrage is the work of strikers."

The Staunton, Va., *Vindicator* of July 31 says: "A dynamite cartridge was placed on the frog of the switch on the Chesapeake & Ohio Railway at Sunnyside and tore out the front trucks of a freight engine passing over it. The track was terribly torn up and pieces of iron thrown 100 ft. up on the side of the mountain."

Monkey Track-hands.

Between a place called Niddivunda and Herebully there is a large tope which is well known to be infested with a host of monkeys. Having no other mode of occupying their dull hours, they are bent upon trying to destroy the Tumkur line. It would appear that these animals, about 50 or 60, form themselves into two batches; they range themselves systematically one-half on one rail and the other half on the other. They begin by first removing the earth from the sides of the rails. Then they arrive at the difficulty of nuts and bolts, which, though they examine them very minutely, they can not get over. On the approach of the up or down train they wait till the engine is within a few yards, when, with the utmost coolness, they simply jump on one side till the train has passed, and then resume their work.

A remarkable instance occurred on one of these occasions. As the engine was approaching, the monkeys made their usual jumps, with the exception of one, who persisted in remaining on the line, the engine by this time being very near. Five or six monkeys, seeing the danger one of their number was in, made a sudden rush and dragged him off, some laying hold of him by the tail, others by the legs; anyhow they saved him. They are now staying the Niddivunda gangmen by the guards and drivers. —*Madras (India) Mail.*

A Foolhardy Brakeman.

The Chicago, Rock Island & Pacific Railroad Co. has an acrobatic brakeman who is fond of amusing himself turning cart-wheels on the top of the cars when the train is running, the crossing of a high bridge being the time when his performances are most frequently displayed. There is a very high bridge crossed by the road at Iowa City, and the idlers of that place have got in the habit of congregating at the bridge when the acrobatic brakeman's train comes along, to witness his feats. We predict that his fondness for turning cart-wheels will eventually bring him into fatally close relation with the car-wheels. —*Car-Builder.*



Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

JUNE EARNINGS.

Our large table of railroad earnings in June is unusually complete, the Chicago, Burlington & Quincy, the Erie and its leased line, the New York, Pennsylvania & Ohio, and the Union Pacific all reporting early enough to be included, which is unusual. These are more important roads than the average, and their inclusion gives a better idea than the table usually does of the general condition of traffic. The aggregate mileage and earnings and the average earnings per mile of the 85 roads reporting are:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|------------------------|--------------|--------------|--------------|-------|
| Miles..... | 65,895 | 64,218 | + 1,677 | 2.6 |
| Earnings..... | \$31,578,080 | \$32,327,258 | -\$749,178 | 2.3 |
| Earnings per mile..... | 479 | 503 | - 24 | 4.8 |

The decreases are not very great, but the comparison is with a month of an exceptionally large decrease last year, and after a series of decreases since 1881. In 1882, the 54 roads reporting earned per mile 10.4 per cent. less than in 1881; in 1883, the 77 reporting earned 1.4 per cent. less than in 1882, and in 1884, the 76 reporting earned 10.9 per cent. less than in 1883; now we have a further decrease of 4.8 per cent. In May last the average decrease was 11.1 per cent., comparing with a month more favorable than the following June.

There are reports from six Far Western roads, including not only the Union Pacific, but the Atchison, Topeka & Santa Fe. These, with an increase of 3 per cent. in mileage, have an increase of 8.4 per cent. in earnings, and their average earnings per mile increased 6½ per cent., from \$402 to \$428. There are large gains by the two Denver roads (28 and 54 per cent.), and a considerable one by the Union Pacific; a small loss by the Atchison, and a large one by the St. Joseph & Western. The June earnings of the principal roads for five years have been:

| | 1881. | 1882. | 1883. | 1884. | 1885. |
|----------------------------|-------------|-------------|-------------|-------------|-------------|
| Atch. & T. P. & S. F. | \$1,197,550 | \$1,153,479 | \$1,261,085 | \$1,254,029 | \$1,218,772 |
| Denver & R. | 584,229 | 545,444 | 678,781 | 449,101 | 539,848 |
| Union Pac. | 2,811,640 | 2,458,812 | 2,273,508 | 1,739,453 | 1,955,395 |

* Including D., R. G. & W. after its completion in 1883.

The Atchison earned this year nearly as much as ever it did; the two Denver roads and the Union Pacific compare favorably with last year, but not with previous years. The Union Pacific had exceptionally light earnings in June last year—\$360,000 less than the month before, and \$636,000 less than the month after.

The four railroads northwest of St. Paul all show decreases except the Canadian Pacific, the Manitoba a very large one, and the Northern Pacific a considerable one. In the aggregate they have a decrease of 7 per cent. in total earnings and 12¼ per cent. in earnings per mile.

The 15 other roads west and northwest of Chicago report:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---------------------|-------------|-------------|--------------|-------|
| Miles..... | 18,402 | 17,617 | + 785 | 4.5 |
| Earnings..... | \$7,929,955 | \$8,148,954 | -\$218,999 | 2.7 |
| Earn. per mile..... | 431 | 463 | - 32 | 7.0 |

With the exception of the Rock Island all the very important roads in this district are included here, and their earnings should represent pretty well the general condition of traffic. Eight of them have increase in total earnings, but only four an increase in earnings per mile, and the latter are all small roads. The average decrease of 7 per cent. in earnings per mile is an important one. The 13 of these which reported last year had:

| | 1885. | 1884. | 1883. |
|------------------------|-------------|-------------|-------------|
| Miles..... | 14,350 | 13,824 | 12,950 |
| Earnings..... | \$5,774,138 | \$5,922,697 | \$6,236,145 |
| Earnings per mile..... | 402 | 428 | 482 |

Thus, with 1,400 miles more road than in 1883, they earned \$462,007 less money, their earnings per mile falling off 16½ per cent., a very serious matter. There were no very large increases or decreases in total earnings this year, the more considerable gains being by small roads.

West and southwest of St. Louis the more important (Gould) roads do not report. Of the eight which do, all but two have an increase in total earnings and earnings per mile, the exceptions being the Fort Scott & Gulf and the St. Louis & San Francisco, the latter losing largely. The large gains are by roads with very light earnings, though the Fort Worth & Denver, by gaining 12½ per cent., made \$401 per mile—above the average of Southern railroads.

North of the Ohio, east of the Chicago & Alton Railroad, and west of Pennsylvania we have reports from 21 railroads, as follows:

| | 1885. | 1884. | Decrease. | P. c. |
|------------------------|-------------|-------------|------------|-------|
| Miles..... | 9,854 | 10,196 | 342 | 3.4 |
| Earnings..... | \$3,704,663 | \$4,152,994 | -\$388,331 | 8.1 |
| Earnings per mile..... | 382 | 407 | 25 | 6.1 |

There is a decrease of mileage as well as earnings here; but the only change is in the Wabash, which, after dropping its most unprofitable lines, still had a decrease from \$330 to \$292 in earnings per mile. Four roads report an increase, and those of the Illinois Central and Evansville & Terre Haute are large. The larger decreases are 12 per cent. by the Flint & Pere Marquette, 13½ by the New York, Pennsylvania & Ohio, 57 by the Ohio Central, 10 by the Peoria, Decatur & Evansville, and 11½ by the Wabash. Ten of these roads had decreases in June last year, and generally the earnings in this district were very bad then. Let us compare some of them:

| | 1885. | 1884. | 1883. |
|---------------------------------|-----------|-----------|-----------|
| Chic. & E. Ill. | \$117,326 | \$123,576 | \$144,143 |
| Chic. & W. Mich. | 112,783 | 118,480 | 136,200 |
| Cin., Ind., St. L. & C. | 177,490 | 132,438 | 199,926 |
| Cin., Wash. & Balt. | 115,697 | 123,604 | 149,444 |
| Cleve., Col., Cm. & Ind. | 252,661 | 274,332 | 338,999 |
| Det. Lansing & Nor. | 102,646 | 109,634 | 132,113 |
| Flint & Pere Marq. | 157,721 | 170,342 | 206,322 |
| N. Y., Pa. & O. | 307,574 | 424,134 | 580,160 |
| Ohio & Miss. | 278,614 | 280,163 | 330,732 |
| St. L., Alt. & T. H., Main Line | 80,604 | 81,725 | 90,955 |

In almost every instance we see that the decrease since 1883 has been very large, though since last year it may have been moderate. The Cincinnati, Washington & Baltimore has lost 22 per cent., the Bee Line 26, the Lansing & Northern 23, the Pere Marquette 23½, and the New York, Pennsylvania & Ohio 27 per cent. since 1883. A restoration of trunk-line rates would do a great deal for these roads.

South of the Ohio and Potomac and east of the Mississippi, 17 roads report:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---------------------|-------------|-------------|--------------|-------|
| Miles..... | 8,445 | 8,195 | + 250 | 3.0 |
| Earnings..... | \$2,689,287 | \$2,777,334 | -\$88,047 | 3.2 |
| Earn. per mile..... | 318 | 339 | - 21 | 6.3 |

Only four of these roads report an increase, and their increases are all small, while some of the decreases are considerable, as 14½ by the Alabama Great Southern, which has gained very steadily heretofore; 17½ by the Mobile & Ohio, and 19½ by the Vicksburg & Meridian. It should be taken into consideration, however, that Southern roads had in the aggregate but a very small decrease last year in June. For them the comparison is with a tolerably favorable month.

Coming now to the Eastern roads, we have reports from the unusual number 14. They report:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---------------------|--------------|--------------|--------------|-------|
| Miles..... | 10,130 | 9,972 | + 158 | 1.6 |
| Earnings..... | \$10,066,483 | \$10,223,344 | -\$156,861 | 1.5 |
| Earn. per mile..... | 994 | 1,025 | - 31 | 3.0 |

This is a smaller decrease than is shown anywhere else, and makes a great contrast with the May report, when 13 roads showed a decrease of no less than 11.7 per cent. in earnings per mile. But the difference is caused largely by the Reading, which in May, earning but little more than in June, earned \$450,518 less than last year, while in June it earned \$279,530 more than last year.

Moreover, last year in June the Eastern roads earned per mile 13.3 per cent. less than in 1883, and they could hardly afford to have another decrease like that. All the important Eastern roads earned much

less last June than in the corresponding month of 1883.

It is noticeable that these Eastern roads, with 15½ per cent. of the total mileage reporting, had 32 per cent. of the total earnings. Their average earnings per mile were \$999; the average of all the rest, only \$386.

PIECE-WORK IN RAILROAD SHOPS.

We regret that the letter published in another column favoring the use of piece-work in railroad shops did not go further into details, which the author was well qualified to give, for he is practicing on a large scale what he preaches in his short letter, and he is in a position, therefore, to make much the same convincing reply to those who deny the possibility as the prisoner who answered, "Why, man, they've done it!" to the lawyer who assured him that he could not be flogged for an alleged offense.

The large shops which he controls are worked upon the piece-work system more largely, perhaps, than any other railroad repair shops in the country, so that few men can speak from a larger stock of experience as to its practical results. His declaration, therefore, that a very large proportion of the work on both locomotive and car repairs can be done by piece-work as well as not, if a little trouble be taken by the proper officers in charge to start the system and keep it going smoothly, merits, and we trust will receive, the careful consideration which the teachings of experience should have in so important a matter.

It would appear, from such facts as are known to us, as if the small extent to which the system is used resulted more from inertia and indifference than from active opposition, and as if this indifference in turn largely resulted from a failure to give due weight to the strongest arguments in favor of it, which, for large shops at least, are not so much financial as moral. The strongest argument which is directly used against the system, perhaps, is that which our correspondent chiefly combats, that no two sets of tires, for example, require the same amount of work, and hence that a price fair for one will not be fair for another. The sufficient answer to this is, that although there are such differences between single tires or sets, yet if the average of a hundred tires be taken the difference will be insignificant, and this not only in the case of tires but in many, in fact nearly all, the other details of repairs, even those which individually differ much more widely than the work of turning off tires. The fact that experience has clearly proven this to be the case so destroys the force of this argument that it is entitled to little real weight, being used, when used at all, more as an excuse than as a reason for inaction.

A far stronger reason, not for opposition but for indifference to the system, is probably more often obscurely felt than put in words, but if put in words would be something like this: "What is the good of it? It will not benefit the company, for we cannot expect to fix a lower price for piece-work than the same work costs us now, or if we do, the little difference will be eaten up in the extra cost of accounts. It will not benefit the officers, but rather make them more trouble. It will not benefit faithful employes who do a fair day's work now, for they work as hard as men ought to, year in and year out, and as for employes who are not faithful, we have no use for them anyway, and do not keep them long around the shop." Thus, the mere suggestion of introducing piece-work on a large scale is liable to be resented by some weak-minded men as implying that they do not manage their shops well now, or "get a fair day's work" from the men.

The worst fallacy in this argument is not the most obvious one, but the most obvious one is that, even if the average remain the same, it is not true as respects many individual workmen that they do not earn far more when their pay is graduated from day to day exactly in accordance with the work they do. Men's capacity for doing even the most mechanical things differs greatly. Even when paid by the day, some do more and some do less than the average. Under the piece-work system experience has shown that not only are these differences increased, but that the average product is likewise increased. Both the company and the men as a whole, therefore, have a chance to and do in fact, we have been assured, gain something financially, while every individual makes the great gain that each and all are now treated fairly, instead of being, under the wages system, all treated unfairly. That this is so is plain, for under that system, since no two men at the same pay will do the same amount of work in the same time, although they may be overpaid or underpaid, yet they never can be fairly paid; and it needs no argument to prove that anything which is not fair is in the long run corrupting, irritating and disadvantageous to all concerned. The disadvantage may be, and is, re-

strained within small limits by good sense and right feeling on both sides, but the disadvantage exists.

Nor is this all. Granting that the wage system was by close watching made perfectly fair between man and man, which in the nature of things it cannot be, there are yet strong reasons why every employer of labor, and especially every large employer, should strive by every means in his power to decrease the number of those who are mere "hands," selling their time for a certain number of hours each day, but having no other interest in what is done with it than to get through the prescribed number of hours as easily as possible. The financial result to both employer and employed may be the same, but their attitude toward each other is not the same. In the one case the interest of both is alike, to get as much work done as possible, and the employé can be safely left to do it when and as he pleases. In the other case the employer in effect *buys the man*, taking his chances of getting out of him the same work in the same time by his direct control over him, in spite of a clear antagonism of interest, the interest of the one being to get as much and of the other to do as little as possible. To put the same thing in another way, in the one case the relation of employer and employed is that of two equal parties to a contract. In the other it is that of master and servant, with all its irritating yet necessary accompaniments of a more or less odious espionage and display of authority, enforced by a power of arbitrary discharge which is often not less brutally abused than in the old days when physical control was in fashion.

The larger the number of employes serving one master, the more these tendencies do and must develop. That they are in the main restrained within very moderate limits, as before stated, by good sense and good feeling and a desire to do what is right and fair on both sides, is a matter of every-day observation. That, nevertheless, the tendency is as stated, and that there is increasing danger in it, is shown by the strikes and other labor troubles, which are also beginning to be almost a matter of every-day observation. They are the outward evidences of an admitted danger of modern industrial life, which no employer—and especially no railroad—can prudently forget. Economy requires that modern industries should be carried on by vast organizations; the more this is done, the more the individual man becomes a mere cog in a vast machine, and the more he feels himself to be so, the more prone he becomes to restlessness and discontent.

There are not wanting alarmists who see in these undoubted difficulties causes for predicting grave and speedy national catastrophes. Without taking so dark a view of the situation, still we do believe that more or less trouble must continue to arise, as there does now, and that much of it might be avoided by timely consideration of natural feelings and reasonable demands. The modern man is restless under conditions where he even appears to be controlled as an inferior and made a mere tool or "hand" of, especially where it seems to be done of choice and not of necessity. Whoever, therefore, relieves him from such appearances alone, and makes him simply a party to a free contract under which he is "his own boss," is rendering a service to the public as well as to both the two parties most immediately concerned.

That the mere substitution of piece-work for day's wages can remove the whole or even the greater part of the difficulty, it would be absurd to claim; but as it will undoubtedly remove some of it, as it will undoubtedly be of some pecuniary benefit to both the parties most directly concerned, and as there are no difficulties in the way which a little study and care will not remove, every responsible railroad officer ought to give the matter his careful attention. No other plan gives a man so fully "a fair field and no favor," and a fair field and no favor is what every man has a right to demand, and in the case of the idle and vicious ought to have forced upon him, whether he demands it or not.

New York Grain Receipts.

Considering what the rail rates have been, it seems strange that any grain has been forwarded by canal this year. But actually during the month of June nearly four-sevenths (56.7 per cent.) of all the grain (not including flour) brought to New York came by canal. But in this case probably canal transportation was worth more and not less than rail transportation. There were large stocks at the consuming places; prices of "futures" were higher than "spot" prices, and to hold in store after arrival costs more for storage, while for about three weeks the canal boat stores while it carries from Buffalo to New York.

The New York receipts in June by water of grain *excluding flour* (of which the canal carries next to

none) for eight years, and their percentage of the total New York grain receipts, have been:

| Year. | Bushels. | P.c. of total. | Year. | Bushels. | P.c. of total. |
|-----------|------------|----------------|-----------|-----------|----------------|
| 1878..... | 6,674,199 | 68.4 | 1882..... | 3,437,751 | 45.4 |
| 1879..... | 5,081,643 | 41.7 | 1883..... | 6,231,910 | 68.0 |
| 1880..... | 11,231,049 | 57.0 | 1884..... | 3,476,335 | 40.3 |
| 1881..... | 6,745,853 | 50.3 | 1885..... | 5,723,400 | 56.7 |

The total New York receipts of grain, excluding flour, in these June have been, in millions of bushels:

| 1878. | 1879. | 1880. | 1881. | 1882. | 1883. | 1884. | 1885. |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 9.7 | 12.4 | 19.7 | 13.4 | 7.6 | 9.2 | 8.6 | 10.1 |

We must remember that there were this year and last four railroads competing for the shipments between Buffalo and New York, in 1883 three, and in 1882 only two, and that one of these railroads has only this year got fairly at work; yet the canal carried a much larger share of the grain this year than last, or in 1882 or 1881, and a little larger even than in 1880, when the rail rate was comparatively very high. The quantity carried also compares favorably with any recent year. While the increase in total receipts over last year has been but 1,500,000 bushels, the receipts by water have increased 2,200,000 bushels; of the total increase of 2,500,000 bushels since 1882, 2,300,000 has come by water; while the total decrease since 1881 has been 3,300,000, the decrease by water has been but 1,000,000; and of the decrease of 2,300,000 since 1879, 642,000 has been the loss of the canal boats and coasting vessels. In 1883, when the Lackawanna was just beginning to carry to New York, but carried very little (137,200 bushels, or 1½ per cent. of the whole), and rates were fairly maintained, the railroads carried a much larger share than after the new railroads secured a larger share of the business, as this year, when they carried 680,575 bushels, which is 15.1 per cent. of the rail receipts, and 6½ per cent. of the total receipts.

It should be said, however, that the canal receipts last year were a much smaller share of the total than in subsequent months of the season of navigation. This, however, does not alter the fact that this year, with rail rates as low as 11½ to 12½ cents per 100 lbs., from Chicago to New York, the canal brought four sevenths of all the grain arriving at New York, apparently entirely unaffected by the doubling of the number of railroads between Buffalo and New York.

The total grain receipts at New York during the month of June last, including flour, were 12,256,275 bushels, of which the canal boats brought 48.8 per cent., coasting vessels 2.1 per cent., while the railroads brought the other 51.2. The shares of the several railroads were not greatly different from what they have been in previous months of this year, though the Erie had a little larger share than before. As for the two new roads, the West Shore seems to have cultivated the business as though it were worth having, taking about an eighth of the receipts by rail, while the Lackawanna brought not half as much. The latter has not had a considerable share of the grain since last January.

For the half-year ending with June the total receipts by rail at New York have been 49,007,454 bushels (against 7,095,654 by canal and 1,202,253 coastwise), and the percentage of the total brought by each railroad for four years has been:

| | N. Y. Cen. | Erie. | Penna. D. | L. & W. Shore. | West. | Others. |
|-----------|------------|-------|-----------|----------------|-------|---------|
| 1885..... | 37.7 | 24.4 | 17.2 | 7.8 | 11.9 | 1.0 |
| 1884..... | 44.3 | 28.7 | 12.4 | 7.3 | 6.3 | 1.0 |
| 1883..... | 45.0 | 32.5 | 15.2 | 6.4 | ... | 0.9 |
| 1882..... | 51.7 | 30.7 | 16.5 | ... | ... | 1.1 |

The two new roads brought 19.7 per cent. of the whole this year, against 13.6 last year, while the one of them then open brought 6.4 per cent. in 1883.

Their share, taking the year 1882 as a basis, has come chiefly from the New York Central, it having lost 14.0 per cent. and the Erie 6.3, while the Pennsylvania has gained 1.2 since then. Since last year the Erie has lost, but not so much as the Pennsylvania has gained, so that still the whole of the West Shore's and Lackawanna's gains may be said to have come from the New York Central.

The total New York receipts of grain and flour in the first half of the year for 11 successive years have been:

| Year. | Bushels. | Year. | Bushels. |
|-----------|------------|-----------|------------|
| 1875..... | 31,879,271 | 1881..... | 62,329,049 |
| 1876..... | 41,372,551 | 1882..... | 41,070,212 |
| 1877..... | 28,219,875 | 1883..... | 52,604,898 |
| 1878..... | 60,250,040 | 1884..... | 42,265,135 |
| 1879..... | 60,714,291 | 1885..... | 57,305,361 |
| 1880..... | 65,983,449 | | |

The proportion received by water in these six months depends so much on the time that navigation is opened that it has not much significance by itself. We have above compared the rail and water receipts in June, which is the only month of the six when there have been arrivals by canal throughout the month in every year. The proportion also depends greatly on the amount carried by rail while the canal was closed. The water receipts were 15.5 per cent. of the

whole this year, against 19.2 last year, 23 in 1883 and 24.1 in 1882.

The total New York receipts this year were larger than in any other since 1881, but were 8 per cent. less than then, 13 per cent. less than in 1880, 5½ per cent. less than in 1879, and 5 per cent. less than in 1878.

We are able to give this week a portion of the introduction to the 1885 volume of Poor's Manual, which will be published in a few days. The introduction is of very great interest, and contains much important material besides what we have copied this week, among other things a table of the railroad securities listed on the New York Stock Exchange in each of the last six years (footing up for the six years no less than \$3,361,017,293, but "only" \$270,000,000 last year), and detailed statements of last year's construction.

We are compelled to postpone any study of the statistics of the Manual, but we have tabulated the chief figures for 1884 and compared them with those for 1883 at the head of our extracts.

The most noticeable facts are that with an increase of 5.8 per cent. in the mileage whose operations are reported, there was an increase of 2.8 per cent. in passenger traffic and of 1.5 per cent. in freight traffic, but a trifling decrease in passenger earnings, and a decrease of 7.7 per cent. in freight earnings, and an aggregate decrease in railroad earnings of 5.2 per cent., amounting to nearly \$44,000,000; while the decrease in net earnings was 8.6 per cent. (\$25,000,000). This is chiefly due to a decrease in the average freight rate from 1.236 to 1.124 cents per ton per mile. The gross earnings per mile fell from \$7,641 to \$6,663 (12½ per cent.), and the net from \$3,702 to \$3,318 (14½ per cent.). It should be kept in mind that the reports are very largely for a year ending with September or some other month in 1884, and not a few for June; the calendar year was doubtless somewhat more unfavorable, as the decreases were greater and more general in the fall months than before.

July earnings so far reported are favorable rather than otherwise, though a comparison with 1883 is less favorable usually than that with last year. We give a few of the important ones below for five successive years:

| | 1881. | 1882. | 1883. | 1884. | 1885. |
|-------------------------|-----------|-----------|-----------|-------------|-----------|
| Northern Pac. | \$393,252 | \$604,067 | \$850,223 | \$1,022,438 | \$999,732 |
| Chic. & N. W. | 1,568,706 | 1,464,927 | 1,820,285 | 1,949,545 | 1,894,000 |
| Chic. & E. Ill. | 1,983,031 | 2,059,952 | 2,160,631 | 1,976,177 | 2,074,000 |
| St. L. & San Francisco. | 252,889 | 330,911 | 270,101 | 367,858 | 324,900 |
| Long Island. | 176,845 | 250,701 | 295,422 | 308,335 | 372,880 |

The Northern Pacific and the Milwaukee & St. Paul earned more this year than in any other except last year; the Northwestern, more than in any except 1883; the Eastern Illinois, less than in any other of the five; the St. Louis & San Francisco, less than in 1882 and 1884, but more than in any other; the Long Island, more than in any other year whatever.

The New York Railroad Commissioners are proceeding with the immense undertaking begun at the beginning of last year, to investigate and report the strength of every railroad bridge in the state, of which there are said to be 3,500. Assuming the moderate average length of 100 ft., this makes 66½ miles of bridging, for all of which, if the Board's circular request is honored, they will receive strain sheets and drawings showing the leading dimensions. Each bridge is then examined on the spot by a bridge engineer in the employ of the Board, assisted by these drawings. Even in preparing the latter it is said that, as might reasonably be expected, many weak places have been discovered and corrected before the drawings were allowed to go in.

Although the Commissioners announced in their report for 1885 that they expected to be ready to report the dimensions and strain of every truss in all these bridges in 1886, we question if they will not find the last gill or so of their quart of molasses running out pretty slowly. Certainly it will be an immense work to carry through in so short a time. But whether they are fully prepared to report or not, they will have accomplished, if indeed they have not already accomplished, the chief end in view—to compel a thorough and general overhauling of the condition of the bridges in the state. Under this plan two parties will have damatory evidence on file against the railroad companies in the archives of the state in case of any bridge disaster, the railroad officials on the one hand and the Railroad Commissioners on the other. Both are therefore likely to take good care to have their record clear, and to do so are compelled to look into matters, in person or by proxy, which it is a melancholy truth that a large proportion of those in official charge of bridges, even among civil engineers,

are not particularly well qualified to look into in person, and, we fear, could hardly be driven to look into by proxy, "just at the present time," by any club less persuasive than a demand from official authority, even if they could be persuaded that it was at all necessary.

Erie Earnings in June.

The Erie report for June shows very nearly the same net earnings as the very light ones of last year, which if last year had not been so unfavorable would be a satisfactory result. The gross and net earnings and working expenses of the Erie proper (omitting the leased Ohio road) in June for the last eight years have been:

| Year. | Gross earnings. | Expenses. | Net earnings. |
|-----------|-----------------|-----------|---------------|
| 1878..... | \$1,258,900 | \$772,080 | \$486,820 |
| 1879..... | 1,230,419 | 939,896 | 290,523 |
| 1880..... | 1,091,812 | 945,794 | 146,018 |
| 1881..... | 1,794,982 | 1,063,752 | 731,230 |
| 1882..... | 1,756,684 | 1,070,822 | 685,862 |
| 1883..... | 1,663,038 | 1,095,020 | 568,018 |
| 1884..... | 1,281,157 | 920,529 | 360,628 |
| 1885..... | 1,202,186 | 830,426 | 362,760 |

The gross earnings and the expenses are the smallest since the reorganization and the net earnings the smallest except last year, and nearly the same as then. Compared with last year and the year before the decreases have been:

| Since 1884: | Gross earnings. | Expenses. | Net earnings. |
|---------------|-----------------|-----------|----------------|
| Amount..... | \$78,971 | \$81,103 | (Inc.) \$2,132 |
| Per cent..... | 6.2 | 8.8 | 0.6 |
| Since 1883: | | | |
| Amount..... | 400,852 | 255,504 | 205,258 |
| Per cent..... | 27.7 | 23.3 | 36.1 |

The decrease in gross earnings since last year was more than made good by the decrease in expenses, but the decrease from 1883 is very large indeed. But 1883 was not a good year for the road, and if we compare with 1881, when its earnings were largest, we find that there has been a decrease of 33 per cent. in gross, and 49½ per cent. in net earnings.

The leased New York, Pennsylvania & Ohio Railroad has earned in June for the three years of the lease:

| | 1885. | 1884. | 1883. |
|---------------------|-----------|-----------|-----------|
| Gross earnings..... | \$367,274 | \$424,133 | \$580,160 |
| Expenses..... | 296,984 | 316,284 | 346,805 |
| Net earnings..... | \$70,290 | \$87,849 | \$233,355 |
| Rental..... | 117,527 | 135,723 | 185,651 |

Balance..... (Def.) \$47,337 (Def.) \$47,874 (Prof.) \$47,704

The decrease on this road is proportionally larger than on the Erie proper. Adding the profit in 1883 and subtracting the deficit in the other two years, we have as the Erie Company's net earnings from the two systems:

| | 1883. | 1884. | 1885. |
|--|-----------|-----------|-----------|
| | \$615,722 | \$312,754 | \$315,523 |

which are to be compared with the net earnings given above for years previous to 1883.

For the nine months of the company's fiscal year ending with June the earnings and expenses of the Erie proper have been:

| Year. | Gross earnings. | Expenses. | Net earnings. |
|--------------|-----------------|-----------|---------------|
| 1877-78..... | \$1,190,504 | \$831,307 | \$359,197 |
| 1878-79..... | 1,264,813 | 870,898 | 393,915 |
| 1879-80..... | 1,095,485 | 828,355 | 267,130 |
| 1880-81..... | 1,589,788 | 1,020,878 | 568,910 |
| 1881-82..... | 1,474,929 | 1,013,223 | 461,706 |
| 1882-83..... | 1,476,377 | 1,024,854 | 451,523 |
| 1883-84..... | 1,283,625 | 926,465 | 357,160 |
| 1884-85..... | 1,139,552 | 798,931 | 340,621 |

Compared with the last year and the year before the decreases are:

| Since 1884: | Gross earnings. | Expenses. | Net earnings. |
|---------------|-----------------|-------------|---------------|
| Amount..... | \$1,654,073 | \$1,285,534 | \$368,539 |
| Per cent..... | 12.8 | 13.9 | 10.4 |
| Since 1883: | | | |
| Amount..... | 3,466,825 | 2,217,923 | 1,248,902 |
| Per cent..... | 23.6 | 21.7 | 27.7 |

Not quite one half (46 per cent.) of the decrease in the gross earnings of the two years occurred in the last year, and 58 per cent. of the decrease in expenses was made then, so that of the decrease in net earnings \$870,363 occurred last year, and \$378,539 this year.

The earnings and expenses of the leased New York, Pennsylvania & Ohio road for the nine months have been:

| | 1884-85. | 1883-84. | Decrease. | P. c. |
|---------------------|-------------|-------------|------------|-------|
| Gross earnings..... | \$3,764,965 | \$4,402,327 | \$638,362 | 14.5 |
| Expenses..... | 2,677,351 | 3,315,540 | 638,189 | 19.1 |
| Net earnings..... | \$1,087,614 | \$1,086,787 | Inc. \$827 | 0.07 |
| Rental..... | 1,204,790 | 1,403,744 | 203,954 | 14.5 |
| Loss..... | \$117,176 | \$321,957 | \$204,781 | 63.7 |

In 1883 this road during the two months it had been worked yielded the Erie a profit of \$101,891 down to the end of June, and its income from the two systems for the last three years (after paying the rental) has been:

| | 1882-83. | 1883-84. | 1884-85. |
|--|-------------|-------------|-------------|
| | \$4,003,414 | \$3,306,202 | \$3,135,447 |

which are to be compared with the net earnings in previous years. Compared with last year the decrease is only 5½ per cent. (\$173,755), but compared with 1883 it is \$1,468,000 (36 per cent.), and compared with 1881, when the profits were largest, the decrease is \$2,548,000, or 45 per cent.

This road is one of those that will gain most by a restoration of trunk-line rates, which will especially help its Ohio leased line.

June Earnings of the Chicago, Burlington & Quincy.

The June earnings and expenses of the Chicago, Burlington & Quincy Railroad have been as follows for the last six years:

| Year. | Miles. | Gross earnings. | Expenses. | Net earnings. |
|-----------|--------|-----------------|-----------|---------------|
| 1880..... | 2,597 | \$1,682,956 | \$834,283 | \$848,673 |
| 1881..... | 2,712 | 2,083,802 | 962,788 | 1,121,014 |
| 1882..... | 3,168 | 1,437,664 | 921,541 | 516,123 |
| 1883..... | 3,231 | 1,937,916 | 968,228 | 969,688 |
| 1884..... | 3,373 | 2,077,182 | 1,064,441 | 1,012,741 |
| 1885..... | 3,490 | 1,992,484 | 1,224,198 | 768,286 |

Thus the gross earnings were 4 per cent. less than last year and 1881, but more than in any other year; the working expenses were much larger than in any other year; and the net earnings were less than in any other year

except 1882, and no less than 24 per cent. less than last year and 18½ per cent. less than in 1883. The net earnings are also less than in any previous month of this year except February, chiefly due to the unusually large expenses. The gross earnings were less than in May, which is not very uncommon, but they were less than in April also, which is uncommon. The light corn movement had something to do with it, doubtless.

For the six months ending with June the earnings and expenses of this road have been:

| Year. | Gross earnings. | Expenses. | Net earnings. |
|-----------|-----------------|-------------|---------------|
| 1880..... | \$9,650,605 | \$4,647,581 | \$5,012,024 |
| 1881..... | 9,098,547 | 4,940,603 | 4,157,944 |
| 1882..... | 9,156,115 | 5,264,603 | 3,891,512 |
| 1883..... | 11,405,203 | 6,053,656 | 5,351,547 |
| 1884..... | 11,616,022 | 6,457,052 | 5,158,970 |
| 1885..... | 12,372,965 | 7,217,321 | 5,155,644 |

Thus the gross earnings for the half-year were larger this year than ever before—6½ per cent. more than last year, and 8½ per cent. more than in 1883. But the working expenses also were much larger than ever before—11½ per cent. more than last year and 19½ per cent. more than in 1883; and this has made the net earnings slightly less than last year and 4 per cent. less than in 1883.

It is a good sign this year when expenses are not reduced too much, but it is not easy to understand why so large an increase has been necessary on this road, at a time when nearly all other roads are making some saving—a good many, more than they ought.

The Strength of Bronzes.

The illustrations herewith show, in a very curious and striking manner, the results of tests made some years since by Prof. R. H. Thurston to determine the strength of all possible bronzes, or triple alloys of copper, tin and zinc.

The number of possible alloys of this kind is of course infinite, yet by the "topographical chart" shown, the tensile strength of any one of them, and the comparative effect of slight variations in the percentage of any metal, can be at once determined by inspection. We have re-arranged and redrawn the chart from one prepared by Lieutenant Pitman, U. S. A., in order to show upon a sheet of paper the same facts as are shown in solid form by the model, of which fig. 2 is an engraving, prepared by Professor Thurston. Fig. 1 is simply what engineers call a "contour map" of the solid surface shown in fig. 2, and might be made from it in the same manner as engineers prepare a topographical map of a natural surface, so that from the map alone the height of any point on the area represented, as well as its position, can be seen.

In such a map a "contour line" representing any given elevation passes through all points on the map which are of the same elevation; in other words, if the given surface were flooded with water up to any given elevation, the "contour line" represents what would be the shore line. The nearer the contour lines together, the steeper the slope. On fig. 1, for example, the closely-drawn series of parallel lines would indicate, to the eye of an engineer studying a similar map of a natural surface, a precipice. On the chart it indicates a rapid falling off in the strength of certain bronzes as the proportion of tin is increased.

In preparing the model of "the strength of the bronzes," a triangular surface is taken on which any possible alloy of the three metals is represented by a point. The strength of various alloys is experimentally determined, and a vertical pin, the length of which is proportioned by a fixed scale to the strength of the alloy, is stuck in that point. If the alloy has a strength of say 5,000 lbs. per square inch, the pin is 5 in. long; if 10,000 lbs per square inch, 10 in. long, etc. By testing enough of these alloys, we should finally have the surface entirely covered with pins of various lengths, forming the surface represented in fig. 2. If the alloys were all of one strength, it would be a level surface; if they varied by some approximately regular law, it would be a sloping, but still smooth surface; if varying in an irregular and apparently lawless manner, as in fact they do, we have such a surface as that actually obtained in fig. 2, which looks almost like a section from the surface of the moon.

In order to obtain a surface on which every point shall represent some alloy of three metals, an equilateral triangle is taken, in which each of the three corners represents an alloy of 100 per cent. of one of the metals, and 0 per cent. of the other two, i. e., the pure metal. Each point on the side of the triangle, as, for instance, the line between copper and zinc (fig. 1), represents some alloy between copper and zinc only, in which there is no tin. The middle point on the line represents, for example, an alloy of 50 per cent. copper, 50 per cent. zinc, and no tin. A point 9-10 of the line from "copper" and only 1-10 of the line from zinc, represents an alloy of 10 per cent. copper, 90 per cent. zinc, and no tin.

If now the space between this side and the opposite apex marked "tin" be divided up into ten or more spaces by equidistant lines parallel with the line "copper-zinc," we have lines on which alloys of 10 per cent., 20 per cent., etc., tin, and varying proportions of copper and zinc are plotted. Those having all copper or all zinc, in addition to the tin, come at the ends of these lines, those with varying proportions of each come in between; but it will be seen that there is a point, and only one point, for every possible alloy, and if the percentages written on the three sets of lines passing through any point on the diagram be summed up, they will always be found to amount to 100 per cent.

In this manner we obtain the very beautiful and striking representation given of the irregularities in strength of bronzes caused by changes in proportions; irregularities, the cause and theory of which are as yet wholly undetermined, if, indeed, they ever can be fully determined, but a study of which is most instructive. The same irregular effects are, it

is true, observed from slight changes in the proportions of mixture of other elements, as, for example, the familiar effect of carbon upon iron, but this makes a diagram of the effect of all possible changes in the composition of so familiar a substance as bronze all the more interesting.

Examining the diagram in detail, we have in it a number of points in which any possible slight change in the composition weakens it, and one point (tin 68, copper 32, zinc 0) in which any possible change strengthens it, with a number of others in which any possible change either strengthens it or has no effect whatever. "The strongest of the bronzes" is seen at once from the chart to be located on the very remarkable peak which has its apex near the copper-zinc line, where an alloy of about copper 55, zinc 43, tin 2 has a strength of 65,000 lbs., or more than the best qualities of ordinary wrought iron. Any considerable change in the proportion of any one of the metals, but especially tin, causes an immense loss of strength far beyond that caused by much more considerable changes in other possible alloys. The increase of the percentage of tin, for example, from 2 per cent. to 15 per cent., the proportion of the other ingredients remaining the same, changes the alloy from the strongest to almost the weakest alloy which it is possible to form, it being no stronger than pure tin. On the other hand, an omission of the small proportion of tin reduces the strength of the alloy from 68,900 to a little more than 50,000 lbs. per square inch.

Similarly, in the lower part of the diagram, in the little circle marked "15,000" (copper 30, tin 20, zinc 50), there is another "peak," although with much gentler slopes, where any change whatever weakens the alloy. Nothing, in fact, is even approximately regular in the whole diagram, except a few tin-zinc alloys along the base, having little or no copper in them, where there is some approach to uniformity in the effect of changes of proportion. All these alloys, however, and in fact all alloys below the foot of the steep slope referred to, are too soft, brittle and weak to be of value except for a few special purposes.

A subsequent investigation by E. H. Jobbins, M. E., of the narrow field covered by the peak of the "strongest of the bronzes" shows that the following two mixtures have the greatest strength and toughness:

1. Copper 56, zinc 42, tin 2, 75,000 + lbs. per square inch;
2. Copper 57, zinc 42, tin 1, 73,000 + lbs. per square inch;

the first mixture being that deemed best for practical use; not on account of the slight difference in strength, but because it is least affected by minute and almost infinitesimal differences of composition. The last mixture, however, seems to be capable of giving the strongest possible bronze. Thus, of two mixtures intended to be exactly alike, one gave a strength of only 61,000 lbs. and the other 85,770 lbs., the latter being by far the strongest mixture made. In the specimens of the first mixture there was a difference of only 700 lbs. in tensile strength.

None of these "strongest of the bronzes" are as yet in use on a commercial scale, if, indeed, they ever will be, a practical difficulty being that such alloys must be honestly and carefully made (in fact, very delicately made, and with very pure metals), or they may be very unreliable. With the ordinary commercial and shop mixtures this is quite different, as we shall see, giving them a very serious advantage, the nature and extent of which is clearly discernible in the diagram.

On top of the "precipice" before referred to, where the lines are so close together, there is what to the eye of an engineer immediately appears as a high plateau, falling away abruptly to the south or bottom of the chart, and much more gently to the north. On the little area covered by this plateau and its northern slope lie substantially all the alloys now in practical use. A straight line passing obliquely across the plateau on the edge of the slope (from tin 20 to zinc 40) marks the southerly limit of present practice. The most useful bronzes lie slightly to the north of the crest line. In the top triangle, 10-10, forming the copper apex, lie the *statuary bronzes* (a common mixture being about in the centre of the triangle), the *coin bronzes* (along the tin (west) edge, zinc not being used in them) and the *gun-metal bronzes*, a common mixture for the latter being in the southwest corner of the triangle (copper 90, tin 10, zinc 0). A mixture with more tin in it would have a higher tensile strength, as will be seen; but those mixtures, although stronger, are less ductile and have a lower elastic limit.

These qualities, however, are not disadvantageous for journal-bearing bronzes, and accordingly most of the common mixtures for the latter lie in the triangle 10-20-80, having the figures for tensile strength "47,500" in the centre of it. Here it will be seen that within a considerable range a variation of composition is unimportant, because the slopes indicated by the contour lines are gentle.

Many mixtures giving tough and good bronzes for machinery work lie scattered all along the "plateau" to the south and east of the triangle referred to. The southwest corner of the latter (tin 16 to 20, copper 80 to 84) is a common *bell metal* mixture. Still larger proportions of tin are used, however, up to even 30 per cent. for small bells.

Following down the tin edge, at tin 25 to 33, or directly on the steep slope, we have *speculum metal*, used for telescopes, etc., which has the color and takes the polish of silver, but is brittle and worthless for mechanical use.

At the southeasterly extremity of the diagonal line, over the plateau (zinc 40, copper 60), lies *Muntz sheeting metal*, which is a readily rolled and worked brass, much stronger and cheaper than pure copper, and hence chiefly used at the present day instead of it for vessels. Various fine bronzes * lie just above this line on the smoother part of the plateau.

* A brass is properly an alloy of copper and zinc; a bronze, of copper and tin; and alloys of copper, zinc and tin are called either bronzes or bronzes, somewhat indifferently, but more or less according to which they resemble most closely.



Fig. 2.—View of the Surface Represented in Fig. 1.

The commonest varieties are in the vicinity of zinc 30, copper 70, with sometimes a little tin.

Near the middle of the steep slope lies an alloy sometimes used for statuary, and just below it, nearly in the middle of the deepest hollow (*i. e.*, the weakest bronze), is a composition sometimes used for speculum metal. No other useful alloys are found in the whole lower portion of the diagram until near the southeast corner of the map, where (near copper 5, tin 20, zinc 75) are a few alloys sometimes used for lightly-loaded bearings, pump-cocks, etc.

The ductility of the bronzes is not represented on the chart, but the tensile strength only. Fortunately the same diagram enables the variations of this property also to be readily understood. Draw a line from tin 25, southeast along about the middle of the steep slope, to zinc 55. The bronzes on this line, although immensely strong, have no more ductility than glass, and break very much like it. Drawing lines parallel with this toward the upper apex, each one represents bronzes of more and more ductility. All those on the highest ridge, however, are of about the same ductility, and have much less than the bronzes on the gentle slope to the north.

This diagram, be it observed, represents the irregularities which occur with various mixtures of three metals only. If other elements be added, iron, antimony, phosphorus, manganese, etc., the results would become simply bewildering in their complexity and apparent lawlessness, if one should attempt to get a general view of the effect of modifications such as is afforded by the diagram above. Whether they be really lawless, as some scientists think, or whether there be some underlying law which will some day bring order out of the apparent chaos and enable the qualities of a given combination to be predicted in advance, it is yet too soon to say; but certainly we do not at the present time seem to be getting any nearer to it. Our present knowledge is as purely empirical as was the knowledge of the Japanese as to where needles could be stuck into the human body with safety, which the Autocrat of the Breakfast Table tells about. In applying their remedy of *acupuncture*, a long series of trials, some with unhappy results, had determined some places where needles could be stuck into the body with safety and some where they could not, all of which were marked by spots upon a doll. A better knowledge of anatomy has made all this superfluous; but our present knowledge of metallurgy may be said, with essential truth, to be made up of spots upon a doll. We know that a certain thing is so, because we have tried it. *Why* it is so, or what would be the effect of certain things which we have not tried, we not only do not know, but do not even know how to find out.

In the meantime, we have in the diagram before us a pretty good evidence of the reason why the bronzes which are now most generally used are preferred, and why certain other bronzes, which would be stronger and better than those in use, if we could only get them, are neglected. It is because it is so hard to get them with ordinary commercial metals, since a little deviation from the exact composition makes so great a difference.

Chicago through shipments eastward last week were the lightest of which we have record. For the week ending Aug. 1 and corresponding weeks of previous years the shipments have been:

| | | | | | |
|--------|--------|--------|--------|--------|--------|
| 1880. | 1881. | 1882. | 1883. | 1884. | 1885. |
| 34,371 | 59,370 | 19,634 | 24,453 | 24,423 | 17,490 |

The smallest shipments in any week last year were 22,960 tons, in the first week of August; and in only eight weeks of that year were the shipments less than 30,000 tons, and down to this time last year in only two weeks. The smallest week's shipments in 1883 were 23,584 tons, in the first week of July, and there were nine weeks that year when the shipments fell below 30,000 tons. The lightest shipments until last week were 19,634 tons, in the last week of July, 1882, and these were 2,144 tons (12 per cent.) more than last week, and there were 16 weeks that year when the total was less than

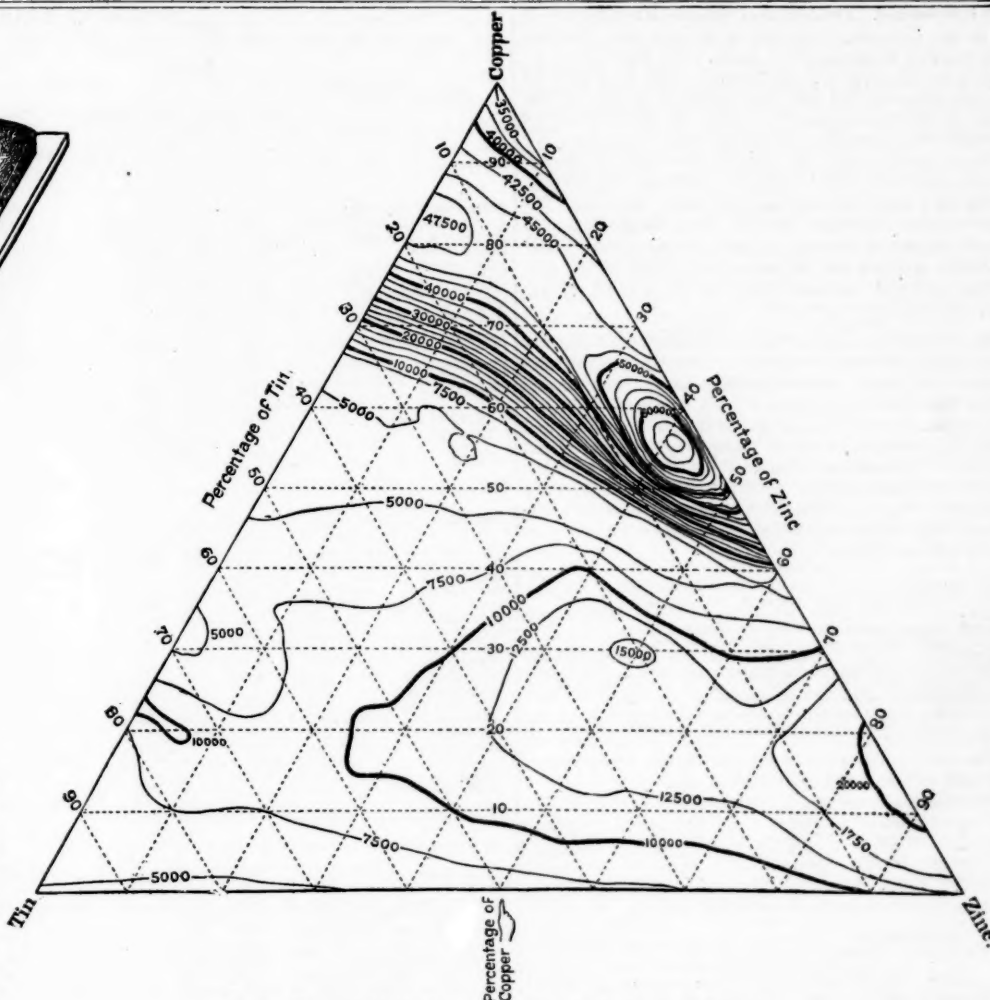


Fig. 1.—Topographical Chart of the Tensile Strength of Bronzes.

(Figures give tensile strength in pounds per square inch.)

30,000 tons. There was only one such week in 1881, and three in 1880.

For six successive weeks the tons shipped and the percentage of the total carried by each railroad have been;

[illegible]

The decrease last week from the previous week is about 15 per cent. in the total. The provision shipments, though 2½ per cent. less than the previous week, however, are larger than when the total shipments were over 80,000 tons per week, last April. The flour shipments were 57½ per cent., and the grain shipments 60½ per cent. less than two weeks ago, before the advance in rates took effect.

This is the season when shipments are usually lightest, and there is reason to suppose that the time of light shipments will last longer than in most years, because of the exceptionally bad crop of winter wheat. Chicago does not usually feel the effect of this crop until about the first week of August, but it is questionable whether it will feel it at all this year, as the low prices tend to make the farms keep back what little they have to spare. The spring wheat crop is not usually felt till about the first of September. Detroit is likely to show signs first of a movement of this year's harvest, the wheat (winter) crop of Michigan being very good indeed.

The percentages last week do not differ greatly from those of the week before, a gain by the Nickel Plate being nearly balanced by a loss of the Lake Shore, and a loss of 3.2 per cent. by the Chicago & Atlantic being balanced by small gains by several roads. The three Vanderbilt roads together carried 30.4 per cent. of the whole, and the two Pennsylvania roads 30.8. There have been several weeks when a single railroad has carried more than the total shipments by the eight roads last week, some of which were as follows:

| Week to | | Tons |
|-----------|--------------------------|--------|
| Jan. 31, | 1885, Lake Shore carried | 21,958 |
| Feb. 7, | " " | 23,094 |
| March 21, | " Mich. Cen. " | 18,711 |
| March 28, | " " " " | 18,255 |
| April 4, | " " " " | 20,560 |
| April 18, | " Fort Wayne " | 18,052 |
| April 25, | " " " " | 17,788 |
| May 2, | " Mich. Cen. " | 20,166 |
| Aug. 1, | " the eight roads " | 17,400 |

At current rates, if all this freight had gone through to New York, the earnings from it last week would have been \$77,778, and perhaps \$25,300. The Chicago road, which carried most (Fort Wayne), probably made a profit of not more

than \$3,000, and the one which carried least (Michigan Central) perhaps \$1,000. There were weeks in 1880 when the profits of the Michigan Central (including Canada Southern) on the Chicago shipments were probably as much as \$10,000.

It must be remembered, however, that the last week was altogether exceptional in lightness of traffic, and that the Michigan Central then had an exceptionally small share of it.

The Union Pacific made a large increase in earnings last June, but there was a still greater increase in its working expenses, and its net earnings were exceptionally light. For the last three years its earnings and expenses in June and for the six months ending with June have been :

| | | | |
|----------------------|-------------|-------------|-------------|
| <i>June:</i> | 1885. | 1884. | 1883. |
| Gross earnings | \$1,956,395 | \$1,739,453 | \$2,273,598 |
| Expenses | 1,554,915 | 1,220,575 | 1,108,672 |
| Net earnings..... | \$400,480 | \$518,878 | \$1,164,926 |
| <i>Six months:</i> | | | |
| Gross earnings..... | 11,224,529 | 10,093,818 | 12,969,723 |
| Expenses..... | 7,949,843 | 7,034,093 | 6,593,576 |

| | | | |
|--------------------|-------------|-------------|-------------|
| Net earnings | \$3,274,686 | \$3,350,725 | \$3,375,847 |
|--------------------|-------------|-------------|-------------|

Thus the gross earnings, though 12½ per cent. more than last year in June, were 14 per cent. less than in 1883, and the net earnings were 23½ per cent. less than last year and 64 per cent. less than in 1883.

For the half-year the gross earnings this year were 2 per cent. more than last year and 13½ per cent. less than in 1883, while the net earnings, though 2½ per cent. less than last year, were 49 per cent. less than in 1883, the latter decrease in the net earnings being equal to more than 5 per cent. on the capital stock.

The Union Switch and Signal Company is endeavoring to perfect the details of several improvements in various applications of railroad signals. Among them is an arrangement for working the gates of road crossings. The gate itself is made of a horizontal bar from which depend short cords, to the ends of which weights are attached. This fringe-like arrangement prevents any damage being done to either person or vehicle should the gate be suddenly shut down upon them. The gate is moved by pistons working in cylinders to which compressed air can be admitted. The valves regulating the admission are normally kept to their seats by the pressure of the air, but are forced off by a spindle which can be drawn down by an electro-magnetic current.

Another new crossing gate, regarded by several railroad men as of much promise, has recently been tried, and is now in operation, on the Staten Island Railroad. It operates by the direct power of the locomotive. At the distant station (varied according to the maximum speed of trains), a side rail set slightly above the level of the rails is pushed out laterally two inches or more by the driving wheels, transmitting sufficient force to release a trip at the gate itself to per-

mit it to descend. The descent of the gate is regulated so as to be very slow, and a bell rings at the same time, affording due warning to approaching teams. The slight force required for this purpose is transmitted 1,000 ft. or more by wooden bars combined with short stretches of iron rod, the effect of the two combined being that the transmitting rod does not vary in length, it is claimed, with the weather.

As the engine passes the gate it presses down a side rail which raises the gate and places it in condition to be lowered again by a train approaching from either direction. The apparatus is so arranged that the train has no effect upon the distant station beyond the gate, which is acted on only by trains going in one direction. The details of the gate seem to have been carefully worked out, and it is not particularly expensive or complicated.

The London *Financial News* has recently published, in a series of articles, what is perhaps the most trustworthy summary of the present, past and probable future of the Panama Canal which has as yet appeared from a presumably impartial source. Serious charges against the good judgment and even the good faith of M. de Lesseps, both before, at and since the "International Congress" which inaugurated the project, are made in these articles (although not with any appearance of personal animus), into which we need not enter. The essential facts presented are very striking, however, and are in brief as follows:

Estimates.

First estimate (at the Congress), with 60,000,000 cu. yds. excavation and 25 per cent. for contingencies \$204,000,000
Second estimate (after brief re-survey of isthmus), with 97,500,000 cu. yds. and 10 per cent. contingencies 167,000,000
Third estimate (Lesseps' last preliminary revision) 128,000,000
Actually expended to Sept., 1884 101,000,000
Fourth (present) estimate, 163,000,000 cu. yds., of which only 17,000,000 cu. yds. has as yet (up to end of Sept., 1884) been removed, with expenditures to date of 109,000,000

The total quantity of excavation in the canal is now officially estimated at 163,000,000 cu. yds.

The capital account stands as follows:

| | |
|--|---------------|
| Par value of stock sold in 1881 | \$28,700,000 |
| " " " " " 1882 | 24,300,000 |
| " " " " " 1883 | 57,300,000 |
| " " " " " 1884 | 37,700,000 |
| Total | \$148,000,000 |
| Less discounts of sales of securities (27 per cent.) | 40,000,000 |
| Leaving as net proceeds | \$108,000,000 |
| Of which there had been spent to Sept., 1884 | 101,000,000 |

Leaving in hand at that date only \$7,000,000

To show for this expenditure, in actual work done, there is less than 11 per cent. of the excavation for the canal proper, and nothing whatever on the immensely difficult and costly works for restraining the Chagres River, which, with necessary harbor improvements still untouched, is now estimated to cost \$39,000,000. The remainder of the \$101,000,000 expended has gone for the Panama Railroad and for "installation" expenses; \$8,750,000 out of the first money raised having "gone at once into the pockets of promoters and for preliminary expenses." The estimated cost of completing the work is now:

| | |
|--|---------------|
| 146,000,000 cu. yds. excavation at 93 cts. | \$136,000,000 |
| Chagres River and harbor works | 39,000,000 |
| Interest for at least 7 years | 97,000,000 |
| Administration, Paris and Panama | 10,000,000 |

Total net cash expenditures \$282,000,000
Or, in securities sold at 26 per cent. discount 382,000,000
Add capital account to date 148,000,000

Total ultimate capital account \$530,000,000

"This, we repeat," says the *Financial News*, "is without any contingent expenses, and on the hypothesis: (a) That the work will be done in seven years, which is not deemed possible by most authorities; (b) that the excavations yet to be done do not exceed 112,000,000 cubic metres; (c) that the improvements of the harbors and the Chagres are to cost only \$8,000,000, a figure that, to judge from what is known of the Chagres, might just as well be \$80,000,000."

Considering that the net revenue of the Suez Canal was last year only some \$7,100,000, the financial outlook for the enterprise is not brilliant. The "American committee," however, whoever they were, appear to have made a good thing of it, as they figure in the account for \$2,400,000.

Record of New Railroad Construction.

Information of the laying of track on new railroads in the current year is given in the present number of the *Railroad Gazette* as follows:

California Southern.—Track laid from Waterman, Cal. south to the Willows, 16 miles; also from San Bernardino north 14 miles.

Kansas & Gulf Short Line.—Extended southward beyond last point noted, 3 miles.

This is a total of 33 miles on 2 roads, making 1,305 miles thus far reported for the current year. The new track reported to the corresponding date for 14 years past has been:

| | Miles | 1878 | Miles |
|------|-------|-------|-------|
| 1885 | 1,305 | 947 | |
| 1884 | 1,859 | 845 | |
| 1883 | 2,796 | 1,145 | |
| 1882 | 3,607 | 594 | |
| 1881 | 3,115 | 1,966 | |
| 1880 | 2,631 | 1,966 | |
| 1879 | 1,373 | 3,372 | |

This statement covers main track only, second or other additional tracks and sidings not being included.

NEW PUBLICATIONS.

Manual of the Theory and Practice of Topographical Surveying by means of the Transit and Stadia. By Prof. J. B. Johnson, C. E. John Wiley & Sons, New York.

That the stadia is less used for many kinds of surveys than its economy and convenience deserve we think there can be no doubt. A disadvantage which impedes its use is that it re-

RAILROAD EARNINGS IN JUNE.

| NAME OF ROAD. | MILEAGE. | | | | | EARNINGS. | | | | | EARNINGS PER MILE. | | | | |
|-----------------------------------|----------|--------|------|------|-------|------------|------------|----------|---------|-------|--------------------|----------|----------|-------|--------|
| | 1885. | 1884. | Inc. | Dec. | P. c. | 1885. | 1884. | Inc. | Dec. | P. c. | 1885. | 1884. | Inc. | Dec. | P. c. |
| EASTERN ROADS. | | | | | | | | | | | | | | | |
| Baltimore & Potomac..... | 92 | 92 | | | | \$ 103,957 | \$ 101,965 | \$ 1,992 | \$ | | \$ 1.9 | \$ 1,130 | \$ 1,108 | \$ 22 | \$ 1.9 |
| Boston, Hoosac Tun. & West. | 87 | 87 | | | | 38,139 | 38,592 | | 453 | | 1.1 | 438 | 443 | 5 | 1.1 |
| Danbury & Norwalk..... | 37 | 37 | | | | 18,549 | 18,497 | 52 | | | 0.3 | 501 | 500 | 1 | 0.3 |
| Grand Trunk..... | 2,918 | 2,918 | | | | 1,102,281 | 1,363,836 | | 161,555 | | 12.8 | 378 | 433 | 55 | 12.8 |
| Long Island..... | 354 | 354 | | | | 284,257 | 289,176 | | 4,919 | | 1.7 | 803 | 817 | 14 | 1.7 |
| N. Y. & Lake Erie & West..... | 1,075 | 1,075 | | | | 1,202,186 | 1,281,157 | | 78,971 | | 6.2 | 1,116 | 1,192 | 76 | 6.2 |
| N. Y. & New England..... | 400 | 400 | | | | 271,057 | 283,530 | | 12,473 | | 4.4 | 678 | 709 | 31 | 4.4 |
| N. Y., Ontario & Western..... | 373 | 373 | | | | 153,142 | 167,912 | | 14,770 | | 8.8 | 411 | 450 | 39 | 8.8 |
| N. Y. & Sus. & Western..... | 147 | 147 | | | | 90,222 | 82,970 | 7,252 | | | 8.7 | 614 | 564 | 50 | 8.7 |
| Northern Central..... | 322 | 322 | | | | 416,219 | 416,635 | | 416 | | 0.1 | 1,293 | 1,295 | 2 | 0.1 |
| Pennsylvania..... | 2,270 | 2,125 | 145 | | 6.9 | 3,735,639 | 3,906,175 | | 176,536 | | 4.3 | 1,645 | 1,838 | 193 | 10.6 |
| Philadelphia & Reading..... | 1,560 | 1,560 | | | | 2,428,393 | 2,148,763 | 279,530 | | | 13.0 | 1,557 | 1,377 | 180 | 13.0 |
| Rochester & Pittsburgh..... | 294 | 294 | | | | 111,404 | 111,763 | | 298 | | 0.2 | 379 | 380 | 1 | 0.2 |
| West Jersey..... | 201 | 188 | 13 | | 6.9 | 111,048 | 112,374 | | 1,323 | | 1.2 | 550 | 598 | 48 | 8.0 |
| Total, 14 roads..... | 10,130 | 9,972 | 158 | | 1.6 | 10,066,483 | 10,223,344 | 288,826 | 445,687 | | 1.5 | 994 | 1,025 | 31 | 3.0 |
| Total inc. or dec..... | | | 158 | | 1.6 | | | | 156,861 | | 1.5 | | | 31 | 3.0 |
| SOUTHERN ROADS. | | | | | | | | | | | | | | | |
| Alabama Great Southern..... | 290 | 290 | | | | 68,013 | 79,749 | | 11,736 | | 14.7 | 235 | 275 | 40 | 14.7 |
| Cin., N. O. & Tex. Pacific..... | 336 | 336 | | | | 206,386 | 212,051 | | 5,665 | | 2.7 | 614 | 631 | 17 | 2.7 |
| Florida Ry. & Nav. Co..... | 528 | 500 | 28 | | 5.6 | 72,353 | 73,190 | | 837 | | 1.0 | 137 | 146 | 9 | 6.2 |
| Ill. Cen., Southern Div..... | 711 | 578 | 133 | | 23.0 | 244,247 | 253,001 | | 8,754 | | 3.4 | 344 | 438 | 94 | 21.4 |
| Louisville & Nash..... | 2,015 | 2,065 | | 50 | 2.4 | 1,009,570 | 1,032,359 | | 22,789 | | 2.2 | 501 | 500 | 1 | 0.2 |
| Mobile & Ohio..... | 528 | 528 | | | | 115,270 | 140,036 | | 24,766 | | 17.7 | 218 | 265 | 47 | 17.7 |
| Nashville, Chatta. & St. L..... | 574 | 554 | 20 | | 3.6 | 147,700 | 161,957 | | 14,257 | | 8.8 | 257 | 293 | 36 | 12.4 |
| N. Orleans & Northeastern..... | 195 | 195 | | | | 35,361 | 37,238 | | 1,867 | | 5.0 | 181 | 191 | 10 | 5.0 |
| Norfolk & Western..... | 512 | 503 | 9 | | 1.8 | 191,767 | 183,869 | 7,898 | | | 5.7 | 374 | 366 | 8 | 2.2 |
| Rich. & Danville..... | 757 | 757 | | | | 266,294 | 251,819 | 14,475 | | | 5.7 | 352 | 333 | 19 | 5.7 |
| Char., Col. & Augusta..... | 370 | 356 | 14 | | 3.9 | 42,745 | 38,259 | 4,486 | | | 7.7 | 116 | 108 | 8 | 7.4 |
| Col. & Greenville..... | 296 | 296 | | | | 30,974 | 28,148 | 2,826 | | | 10.1 | 105 | 95 | 10 | 10.1 |
| Georgia Pacific..... | 318 | 288 | 30 | | 10.4 | 38,010 | 46,221 | | 2,211 | | 5.5 | 120 | 140 | 20 | 14.3 |
| Virginia Midland..... | 352 | 352 | | | | 118,993 | 128,433 | | 9,440 | | 7.4 | 338 | 365 | 27 | 7.4 |
| Western N. Carolina..... | 274 | 208 | 66 | | 31.8 | 25,787 | 29,629 | | 3,842 | | 13.0 | 94 | 142 | 48 | 35.8 |
| South Carolina..... | 247 | 247 | | | | 50,323 | 55,774 | | 5,251 | | 9.4 | 205 | 226 | 21 | 9.4 |
| Vicksburg & Meridian..... | 142 | 142 | | | | 25,294 | 31,571 | | 6,277 | | 19.6 | 178 | 222 | 44 | 19.6 |
| Total, 17 roads..... | 8,445 | 8,195 | 300 | | 3.0 | 2,689,287 | 2,777,334 | 29,045 | 117,692 | | 3.2 | 318 | 339 | 21 | 6.2 |
| Total inc. or dec..... | | | 250 | | 3.0 | | | | 88,047 | | 3.2 | | | 21 | 6.2 |
| CENTRAL GROUP. | | | | | | | | | | | | | | | |
| Chi. & Eastern Illinois..... | 252 | 252 | | | | 117,326 | 123,576 | | 6,250 | | 5.0 | 466 | 490 | 24 | 5.0 |
| Chi. & West Michigan..... | 410 | 410 | | | | 112,783 | 118,499 | | 5,716 | | 4.9 | 275 | 289 | 14 | 4.9 |
| Cin., Ind., St. L. & Chicago..... | 342 | 342 | | | | 177,400 | 192,438 | | 14,978 | | 7.8 | 519 | 563 | 44 | 7.8 |
| Cin., Wash. & Baltimore..... | 284 | 284 | | | | 115,697 | 123,604 | | 7,907 | | 6.4 | 407 | 435 | 28 | 6.4 |
| Cleve., Akron & Columbus..... | 144 | 144 | | | | 42,562 | 44,382 | | 1,820 | | 4.1 | 296 | 308 | 12 | 4.1 |
| Cleve., Col., Cin. & Ind..... | 391 | 391 | | | | 252,661 | 273,332 | | 20,671 | | 7.6 | 646 | 699 | 53 | 7.6 |
| Detroit, Lansing & No..... | 258 | 258 | | | | 102,646 | 109,634 | | 6,988 | | 6.3 | 308 | 425 | 117 | 6.3 |
| Evansville & Terre Haute..... | 146 | 146 | | | | 61,152 | 52,544 | 8,608 | | | 16.2 | 419 | 360 | 59 | 16.2 |
| Flint & Pere Marquette..... | 362 | 362 | | | | 157,721 | 179,343 | | 21,622 | | 12.1 | 436 | 495 | 59 | 12.1 |
| Illinois Central, Ill. lines..... | 953 | 953 | | | | 527,949 | 474,658 | 53,291 | | | 11.4 | 554 | 498 | 56 | 11.4 |
| Ind., Bloom. & West..... | 532 | 532 | | | | 167,544 | 173,671 | | 6,127 | | 3.5 | 315 | 326 | 11 | 3.5 |
| Lake Erie & Western..... | 386 | 386 | | | | 78,581 | 75,715 | 2,866 | | | 3.8 | 203 | 196 | 7 | 3.8 |
| N. Y., Pa. & Ohio..... | 570 | 570 | | | | 367,274 | 424,134 | | 56,860 | | 13.4 | 644 | 744 | 100 | 13.4 |
| Ohio Central..... | 212 | 212 | | | | 42,204 | 98,463 | | 56,199 | | 57.1 | 199 | 464 | 265 | 57.1 |
| Ohio & Mississippi..... | 615 | 615 | | | | 278,654 | 289,163 | | 10,509 | | 3.6 | 453 | 470 | 17 | 3.6 |
| Ohio Southern..... | 130 | 130 | | | | 26,876 | 27,392 | | 516 | | 1.8 | 206 | 210 | 4 | 1.8 |
| Peoria, Decatur & Ev..... | 254 | 254 | | | | 46,715 | 51,881 | | 5,166 | | 10.0 | 184 | 204 | 20 | 10.0 |
| St. L., Alton & Terre Haute | 195 | 195 | | | | 80,604 | 81,225 | | 1,121 | | 1.4 | 413 | 419 | 6 | 1.4 |
| Main Line..... | 138 | 138 | | | | 47,340 | 44,801 | 2,539 | | | 5.6 | 343 | 325 | 18 | 5.6 |
| Belleville Line..... | 138 | 138 | | | | 47,340 | 44,801 | 2,539 | | | 5.6 | 343 | 325 | 18 | 5.6 |
| Tol., Ann Arbor & N. Mich..... | 61 | 61 | | | | 19,498 | 20,317 | | 819 | | 4.0 | 319 | 333 | 14 | 4.0 |
| Wabash, St. L. & Pacific..... | 3,219 | 3,561 | | 342 | 9.6 | 941,356 | 1,174,322 | | 232,966 | | 19.9 | 292 | 330 | 38 | 11.5 |
| Total, 21 roads..... | 9,854 | 10,196 | | 342 | 3.4 | 3,764,663 | 4,152,994 | 67,904 | 456,235 | | 8.1 | 382 | 407 | 25 | 6.1 |
| Total inc. or dec..... | | | | 342 | 3.4 | | | | 388,331 | | 8.1 | | | 25 | 6.1 |
| NORTHWESTERN ROADS. | | | | | | | | | | | | | | | |
| Bur., Cedar Rap. & No..... | 990 | 714 | 276 | | 39.0 | 230,451 | 206,418 | 24,033 | | | 11.6 | 233 | 289 | 56 | 19.4 |
| Central Iowa..... | 500 | 500 | | | | 85,015 | 101,943 | | 16,930 | | 16.6 | 170 | 204 | 34 | 16.6 |
| Chi. & Alton..... | 850 | 850 | | | | 585,283 | 668,070 | | 82,787 | | 12.5 | 689 | 786 | 97 | 12.5 |
| Chi., Bur. & Quincy..... | 3,480 | 3,373 | 117 | | 3.5 | 1,992,484 | 2,077,181 | | 84,697 | | 4.1 | 571 | 616 | 45 | 7.3 |
| Chi., Mil. & St. Paul..... | 4,804 | 4,796 | 44 | | 0.9 | 1,866,000 | 1,919,962 | | 53,962 | | 2.8 | 388 | 403 | 15 | 3.7 |
| Chi. & Northwestern..... | 3,843 | 3,763 | 80 | | 2.1 | 1,856,900 | 1,906,275 | | 39,375 | | 2.0 | 549 | 530 | 19 | 2.0 |
| Chi., St. P., Minn. & Omaha | 1,320 | 1,300 | 20 | | 1.5 | 467,000 | 466,514 | 486 | | | 0.1 | 354 | 359 | 5 | 1.4 |
| Des Moines & Ft. Dodge..... | 138 | 138 | | | | 27,318 | 32,735 | 3,583 | | | 14.9 | 198 | 172 | 26 | 14.9 |
| Green Bay, W. & St. P..... | 220 | 220 | | | | 30,166 | 24,631 | 5,535 | | | 22.5 | 137 | 112 | 25 | 22.5 |
| Ill. Central, Iowa lines..... | 402 | 402 | | | | 130,505 | 130,640 | | 135 | | 0.1 | 332 | 325 | 7 | 0.1 |
| Marquette, H. & Ont..... | 138 | 138 | | | | 124,365 | 144,760 | | 19,795 | | 13.7 | 966 | 1,049 | 83 | 13.7 |
| Mil., Lake Shore & West..... | 478 | 372 | 106 | | 28.6 | 30,065 | 90,573 | 8,492 | | | 9.3 | 217 | 243 | 26 | 14.8 |
| Mil. & Northern..... | 227 | 227 | | | | 47,255 | 45,558 | 1,697 | | | 3.7 | 208 | 201 | 7 | 3.7 |
| Minneapolis & St. L..... | 562 | 420 | 142 | | 33.8 | 163,333 | 140,076 | 14,257 | | | 9.6 | 291 | 355 | 64 | 18.0 |
| Wisconsin Central..... | 440 | 440 | | | | 124,217 | 103,678 | 20,539 | | | 19.5 | 282 | 236 | 46 | 19.5 |
| Total, 15 roads..... | 18,402 | 17,617 | 785 | | 4.5 | 7,929,955 | 8,148,954 | 78,622 | 297,621 | | 2.7 | 431 | 463 | 32 | 2.7 |
| Total inc. or dec..... | | | 785 | | 4.5 | | | | 218,999 | | 2.7 | | | 32 | 7.0 |
| ROADS NORTHWEST OF ST. PAUL. | | | | | | | | | | | | | | | |
| Canadian Pacific..... | 2,794 | 2,408 | 386 | | 16.1 | 734,862 | 550,661 | 184,201 | | | 33.4 | 263 | 229 | 34 | 14.8 |
| Northern Pacific..... | 2,453 | 2,453 | | | | 1,011,623 | 1,143,123 | | 131,500 | | 11.5 | 412 | 466 | 54 | 11.5 |
| St. P. & Duluth..... | 227 | 227 | | | | 113,048 | 119,662 | | 6,614 | | 5.5 | 498 | 527 | 29 | 5.5 |
| St. P., Minn. & Manitoba..... | 1,397 | 1,387 | 10 | | 0.7 | 491,558 | 712,165 | | 220,607 | | 31.0 | 352 | 513 | 161 | 31.4 |
| Total, 4 roads..... | 6,871 | 6,475 | 396 | | 6.1 | 2,351,091 | 2,525,611 | 184,201 | 358,721 | | 6.9 | 342 | 390 | 48 | 6.9 |
| Total inc. or dec..... | | | 396 | | 6.1 | | | | 174,520 | | 6.9 | | | 48 | 12.3 |
| SOUTHWESTERN ROADS. | | | | | | | | | | | | | | | |
| Fort Worth & Denver..... | 144 | 110 | 34 | | 30.9 | 57,787 | 39,121 | 18,666 | | | 47.9 | 401 | 356 | 45 | 12.5 |
| Gulf, Colorado & Santa Fe..... | 536 | 556 | | | | 129,579 | 125,504 | 4,075 | | | 3.2 | 242 | 253 | 7 | 3.2 |
| Kan. City, Ft. Scott & Gulf..... | 389 | 389 | | | | 192,370 | 203,298 | | 10,928 | | 5.3 | 495 | 523 | 28 | 5.3 |
| Kan. City, Sp'd & Memp..... | 282 | 282 | | | | 116,578 | 109,823 | 755 | | | 0.7 | 392 | 389 | 3 | 0.7 |
| St. L., Ft. Scott & Wichita..... | 215 | 160 | 55 | | 34.4 | 60,006 | 40,422 | 19,584 | | | 48.5 | 279 | 253 | 26 | 10.3 |
| St. L. & San Francisco..... | 804 | 775 | 29 | | 3.7 | 298,925 | 365,381 | | 66,456 | | 18.2 | 372 | 471 | 99 | 21.1 |
| Texas & St. Louis..... | 735 | 735 | | | | 69,045 | 65,513 | 3,532 | | | 5.4 | 94 | 89 | 5 | 5.4 |
| Vicks., Shreveport & Pac..... | 170 | 124 | 46 | | 37.1 | 20,504 | 9,109 | 11,395 | | | 125.2 | 121 | 74 | 47 | 67.5 |
| Total, 8 roads..... | 3,275 | 3,111 | 164 | | 5.3 | 938,794 | 958,117 | 58,007 | 77,384 | | 2.0 | 287 | 308 | 21 | 6.8 |
| Total inc. or dec..... | | | 164 | | 5.3 | | | | 19,377 | | 2.0 | | | 21 | 6.8 |
| FAR WESTERN AND PACIFIC ROADS. | | | | | | | | | | | | | | | |
| Atchison, Top. & Santa Fe..... | 2,375 | 2,329 | 46 | | 1.9 | 1,218,772 | 1,254,029 | | 35,257 | | 2.8 | 513 | 538 | 25 | 4.6 |
| California Southern..... | 130 | 130 | | | | 8,681 | | | | | | | | | |

RAILROAD EARNINGS, SIX MONTHS TO JUNE 30.

| NAME OF ROAD. | MILEAGE. | | | | | EARNINGS. | | | | | EARNINGS PER MILE. | | | | |
|------------------------|----------|-------|------|------|-------|------------|------------|-----------|------|-------|--------------------|-------|--------|-------|-------|
| | 1885. | 1884. | Inc. | Dec. | P. c. | 1885. | 1884. | Inc. | Dec. | P. c. | 1885. | 1884. | Inc. | Dec. | P. c. |
| EASTERN ROADS. | | | | | | | | | | | | | | | |
| Balt. & Potomac | 92 | 92 | ... | ... | ... | \$ 655,542 | \$ 577,861 | \$ 77,681 | ... | ... | 13.3 | 7,125 | 6,281 | 844 | 13.3 |
| Bos. & N. O. & Tex. P. | 87 | 87 | ... | ... | ... | 209,724 | 197,379 | 12,345 | ... | ... | 6.3 | 2,411 | 2,268 | 143 | 6.3 |
| Dan. & Norwalk | 37 | 37 | ... | ... | ... | 94,854 | 88,836 | 6,018 | ... | ... | 6.7 | 2,564 | 2,401 | 163 | 6.7 |
| Grand Trunk | 2,918 | 2,918 | ... | ... | ... | 7,126,558 | 7,987,388 | 860,830 | ... | ... | 11.8 | 2,442 | 2,737 | 295 | 11.8 |
| Long Island | 354 | 354 | ... | ... | ... | 1,189,439 | 1,134,976 | 54,463 | ... | ... | 3.0 | 3,304 | 3,206 | 98 | 3.0 |
| N. Y. & Lake E. & W. | 1,075 | 1,075 | ... | ... | ... | 7,094,154 | 7,671,060 | 576,906 | ... | ... | 7.5 | 6,599 | 7,136 | 537 | 7.5 |
| N. Y. & New Eng. | 400 | 400 | ... | ... | ... | 1,513,915 | 1,587,859 | 73,944 | ... | ... | 4.6 | 3,785 | 3,970 | 185 | 4.6 |
| N. Y. Ontario & W. | 373 | 373 | ... | ... | ... | 820,357 | 845,523 | 25,166 | ... | ... | 2.6 | 2,199 | 2,267 | 68 | 2.6 |
| N. Y. Susq. & W. | 147 | 147 | ... | ... | ... | 496,115 | 451,928 | 44,187 | ... | ... | 0.8 | 3,375 | 3,074 | 301 | 0.8 |
| Northern Central | 322 | 322 | ... | ... | ... | 2,597,772 | 2,620,255 | 22,483 | ... | ... | 0.8 | 8,073 | 8,137 | 64 | 0.8 |
| Pennsylvania | 2,268 | 2,110 | 158 | ... | 7.5 | 21,319,600 | 23,333,256 | 2,013,656 | ... | ... | 8.6 | 9,400 | 11,058 | 1,658 | 15.1 |
| Phila. & Reading | 1,560 | 1,560 | ... | ... | ... | 12,710,202 | 14,218,663 | 1,508,461 | ... | ... | 10.6 | 8,148 | 9,114 | 966 | 10.6 |
| Rochester & Pitts. | 294 | 294 | ... | ... | ... | 552,65 | 499,290 | 52,775 | ... | ... | 10.5 | 1,878 | 1,698 | 180 | 10.5 |
| West Jersey | 201 | 188 | 13 | ... | 6.9 | 510,790 | 527,509 | 16,719 | ... | ... | 3.2 | 2,541 | 2,806 | 265 | 9.5 |
| Total 14 roads... | 10,128 | 9,957 | 171 | ... | 1.7 | 56,871,086 | 61,741,713 | 4,870,627 | ... | ... | 7.9 | 5,615 | 6,201 | 586 | 9.5 |
| Total inc. or dec. | ... | ... | 171 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 586 | ... |

SOUTHERN ROADS.

| | | | | | | | | | | | | | | | |
|----------------------|-------|-------|-----|-----|------|------------|------------|---------|-----|-----|------|-------|-------|-----|------|
| Ala. Gt. Southern | 290 | 290 | ... | ... | ... | 519,612 | 527,344 | 7,732 | ... | ... | 1.4 | 1,792 | 1,818 | 26 | 1.4 |
| Cin. N. O. & Tex. P. | 333 | 336 | ... | ... | ... | 1,207,677 | 1,216,186 | 8,509 | ... | ... | 0.7 | 3,595 | 3,620 | 25 | 0.7 |
| Fla. Ry. & Nav. Co. | 528 | 484 | 44 | ... | 9.1 | 500,967 | 517,990 | 17,023 | ... | ... | 3.3 | 949 | 1,070 | 121 | 11.3 |
| Ill. Cent. So. Div. | 711 | 578 | 133 | ... | 23.0 | 2,131,368 | 1,910,007 | 221,361 | ... | ... | 11.6 | 2,998 | 3,305 | 307 | 9.3 |
| Louisville & Nash. | 2,048 | 2,065 | 17 | ... | 0.8 | 6,805,255 | 6,556,245 | 249,010 | ... | ... | 3.6 | 3,323 | 3,175 | 148 | 4.7 |
| Mobile & Ohio | 528 | 528 | ... | ... | ... | 925,948 | 976,386 | 50,438 | ... | ... | 5.2 | 1,754 | 1,849 | 95 | 5.2 |
| Nash. Chat. & St. L. | 374 | 554 | 180 | ... | 3.6 | 1,027,318 | 1,145,181 | 117,863 | ... | ... | 10.3 | 1,797 | 2,067 | 270 | 13.0 |
| N. O. & Northeast | 195 | 195 | ... | ... | ... | 326,956 | 198,907 | 128,049 | ... | ... | 64.3 | 1,677 | 1,020 | 657 | 64.3 |
| Norfolk & Western | 512 | 503 | 9 | ... | 1.8 | 1,237,030 | 1,246,502 | 9,472 | ... | ... | 0.8 | 2,416 | 2,478 | 62 | 2.5 |
| Rich. & Danville | 757 | 757 | ... | ... | ... | 1,855,573 | 1,825,102 | 30,471 | ... | ... | 1.7 | 2,451 | 2,411 | 40 | 1.7 |
| Char. Col. & Aug. | 370 | 356 | 14 | ... | 3.9 | 379,024 | 357,895 | 21,129 | ... | ... | 5.9 | 1,024 | 1,005 | 19 | 1.9 |
| Col. & Greenville | 296 | 296 | ... | ... | ... | 317,788 | 298,854 | 18,934 | ... | ... | 6.3 | 1,074 | 1,010 | 64 | 6.3 |
| Ga. Pacific | 318 | 288 | 30 | ... | 10.4 | 304,222 | 280,222 | 24,000 | ... | ... | 16.9 | 958 | 904 | 54 | 5.8 |
| Va. Midland | 352 | 352 | ... | ... | ... | 692,158 | 732,705 | 40,547 | ... | ... | 5.5 | 1,566 | 2,082 | 516 | 5.5 |
| Western N. C. | 274 | 208 | 66 | ... | 31.8 | 202,026 | 190,936 | 11,090 | ... | ... | 5.8 | 737 | 918 | 181 | 19.4 |
| South Carolina | 247 | 247 | ... | ... | ... | 332,993 | 371,340 | 38,347 | ... | ... | 7.7 | 1,158 | 1,337 | 179 | 7.7 |
| Vicks. & Meridian | 142 | 142 | ... | ... | ... | 198,118 | 225,984 | 27,866 | ... | ... | 12.3 | 1,395 | 1,591 | 196 | 13.3 |
| Total 17 roads... | 8,478 | 8,179 | 299 | ... | 3.6 | 19,163,833 | 18,763,786 | 399,047 | ... | ... | 7.7 | 2,780 | 2,976 | 196 | 6.5 |
| Total inc. or dec. | ... | ... | 299 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 196 | ... |

CENTRAL GROUP.

| | | | | | | | | | | | | | | | |
|-------------------------|--------|--------|-----|-----|-----|------------|------------|-----------|-----|-----|------|-------|-------|-----|------|
| Chi. & Eastern Ill. | 252 | 252 | ... | ... | ... | 743,880 | 688,372 | 55,508 | ... | ... | 8.1 | 2,952 | 2,732 | 220 | 8.1 |
| Chi. & West Mich. | 410 | 410 | ... | ... | ... | 590,988 | 755,672 | 164,684 | ... | ... | 21.8 | 1,441 | 1,843 | 402 | 21.8 |
| Cin. Ind. St. L. & Chi. | 342 | 342 | ... | ... | ... | 1,147,168 | 1,089,609 | 57,559 | ... | ... | 5.2 | 3,354 | 3,156 | 198 | 5.2 |
| Cin. Wash. & Balt. | 284 | 284 | ... | ... | ... | 843,566 | 847,893 | 4,327 | ... | ... | 0.5 | 2,970 | 2,985 | 15 | 0.5 |
| Clev. Akron & Col. | 144 | 144 | ... | ... | ... | 226,519 | 226,902 | 383 | ... | ... | 0.2 | 1,573 | 1,576 | 3 | 0.2 |
| Clev. Col. Cin. & Ind. | 391 | 391 | ... | ... | ... | 1,595,607 | 1,793,863 | 198,256 | ... | ... | 11.1 | 4,081 | 4,588 | 507 | 11.1 |
| Det. Lan. & No. | 258 | 258 | ... | ... | ... | 553,283 | 679,034 | 125,751 | ... | ... | 18.5 | 2,145 | 2,632 | 487 | 18.5 |
| Ev. & Terre Haute | 146 | 146 | ... | ... | ... | 343,024 | 334,552 | 8,472 | ... | ... | 2.5 | 2,349 | 2,291 | 58 | 2.5 |
| Flint & Pere Marq. | 362 | 362 | ... | ... | ... | 930,705 | 1,215,441 | 284,736 | ... | ... | 23.4 | 2,571 | 3,358 | 787 | 23.4 |
| Ill. Cent. Ill. lines. | 953 | 953 | ... | ... | ... | 3,007,070 | 2,873,572 | 133,498 | ... | ... | 4.6 | 3,155 | 3,155 | 140 | 4.6 |
| Ind. Bloom. & W. | 532 | 532 | ... | ... | ... | 1,060,560 | 1,077,973 | 17,413 | ... | ... | 1.3 | 2,051 | 2,025 | 26 | 1.3 |
| Lake S. & Mich. St. | 1,340 | 1,340 | ... | ... | ... | 6,421,071 | 7,230,364 | 809,293 | ... | ... | 11.1 | 4,792 | 5,398 | 606 | 11.1 |
| Michigan Central | 1,505 | 1,468 | 37 | ... | 2.5 | 4,973,000 | 5,003,000 | 30,000 | ... | ... | 11.2 | 3,304 | 3,799 | 495 | 13.0 |
| Ohio & Mississippi | 615 | 615 | ... | ... | ... | 1,752,868 | 1,827,935 | 75,067 | ... | ... | 4.1 | 2,850 | 2,973 | 123 | 4.1 |
| Ohio Southern | 130 | 130 | ... | ... | ... | 201,775 | 205,872 | 4,097 | ... | ... | 1.9 | 1,552 | 1,584 | 32 | 1.9 |
| Peoria, Dec. & Ev. | 254 | 254 | ... | ... | ... | 326,420 | 365,310 | 38,890 | ... | ... | 10.6 | 1,285 | 1,438 | 153 | 11.1 |
| St. L. Alton & T. H. | 195 | 195 | ... | ... | ... | 549,922 | 663,213 | 113,291 | ... | ... | 17.1 | 2,820 | 3,471 | 651 | 17.1 |
| Main Line | 138 | 138 | ... | ... | ... | 345,306 | 378,280 | 32,972 | ... | ... | 8.7 | 2,562 | 2,741 | 179 | 8.7 |
| Belleville Ind. | 81 | 81 | ... | ... | ... | 124,099 | 124,800 | 701 | ... | ... | 0.6 | 2,034 | 2,171 | 137 | 6.5 |
| Tol. Ann A. & N. M. | 3,439 | 3,619 | 180 | ... | 4.9 | 6,897,980 | 7,448,858 | 550,878 | ... | ... | 7.4 | 2,006 | 2,058 | 52 | 2.5 |
| Wab. St. L. & Pac. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total 20 roads... | 11,751 | 11,894 | 143 | ... | 1.2 | 32,065,173 | 35,399,825 | 3,334,652 | ... | ... | 7.7 | 2,780 | 2,976 | 196 | 6.5 |
| Total inc. or dec. | ... | ... | 143 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 196 | ... |

NORTHWESTERN ROADS.

| | | | | | | | | | | | | | | | |
|-----------------------|--------|--------|-----|-----|------|------------|------------|---------|-----|-----|------|-------|-------|-----|------|
| Bur. Ced. Rap. & No. | 952 | 714 | 238 | ... | 33.3 | 1,413,918 | 1,278,743 | 135,175 | ... | ... | 10.5 | 1,485 | 1,791 | 306 | 17.0 |
| Central Iowa | 500 | 500 | ... | ... | ... | 565,432 | 674,181 | 108,751 | ... | ... | 16.1 | 1,131 | 1,348 | 217 | 16.1 |
| Chi. & Alton | 850 | 850 | ... | ... | ... | 3,630,479 | 3,865,865 | 235,386 | ... | ... | 6.1 | 4,271 | 4,548 | 277 | 6.1 |
| Chi. Bur. & Quincy | 3,497 | 3,322 | 175 | ... | 5.0 | 12,372,007 | 11,616,021 | 756,986 | ... | ... | 6.5 | 3,569 | 3,407 | 162 | 4.7 |
| Chi. Mil. & St. P. | 4,804 | 4,760 | 44 | ... | 0.9 | 10,615,000 | 10,427,193 | 187,807 | ... | ... | 1.8 | 2,210 | 2,101 | 109 | 5.1 |
| Chi. N. W. | 3,840 | 3,760 | 80 | ... | 2.1 | 10,684,854 | 10,068,552 | 16,302 | ... | ... | 0.2 | 2,823 | 2,837 | 14 | 0.5 |
| Chi. St. P. M. & O. | 1,313 | 1,293 | 20 | ... | 1.6 | 2,505,032 | 2,693,835 | 187,903 | ... | ... | 7.0 | 1,909 | 2,083 | 174 | 8.3 |
| Des Moines & Ft. D. | 138 | 138 | ... | ... | ... | 169,277 | 155,989 | 13,288 | ... | ... | 8.8 | 1,227 | 1,130 | 97 | 8.8 |
| Ill. Cent. Iowa lines | 402 | 402 | ... | ... | ... | 742,462 | 800,989 | 58,527 | ... | ... | 7.3 | 1,844 | 1,990 | 146 | 7.3 |
| Marquette, H. & O. | 138 | 115 | 23 | ... | 20.0 | 285,195 | 344,387 | 59,192 | ... | ... | 17.2 | 2,067 | 2,995 | 928 | 31.0 |
| Mil. L. S. & W. | 478 | 372 | 106 | ... | 28.6 | 548,313 | 535,539 | 12,774 | ... | ... | 2.4 | 1,447 | 1,440 | 7 | 0.5 |
| Mil. & Northern | 227 | 227 | ... | ... | ... | 273,056 | 259,215 | 13,841 | ... | ... | 7.8 | 1,305 | 1,115 | 190 | 7.8 |
| Minneapolis & St. L. | 562 | 430 | 132 | ... | 33.8 | 945,304 | 835,582 | 109,722 | ... | ... | 13.0 | 1,682 | 1,080 | 602 | 16.0 |
| Wisconsin Central | 440 | 440 | ... | ... | ... | 713,873 | 708,358 | 5,515 | ... | ... | 0.8 | 1,623 | 1,610 | 13 | 0.8 |
| Total 14 roads... | 18,111 | 17,313 | 798 | ... | 4.6 | 45,406,044 | 44,858,451 | 547,593 | ... | ... | 1.4 | 2,510 | 2,591 | 81 | 3.2 |
| Total inc. or dec. | ... | ... | 798 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 81 | ... |

ROADS NORTHWEST OF ST. PAUL.

| | | | | | | | | | | | | | | | |
|----------------------|-------|-------|-----|-----|------|------------|------------|-----------|-----|-----|------|-------|-------|-----|------|
| Canadian Pacific | 2,794 | 2,141 | 653 | ... | 30.5 | 3,352,827 | 2,098,044 | 1,254,783 | ... | ... | 59.8 | 1,200 | 980 | 220 | 22.9 |
| Northern Pacific | 2,453 | 2,450 | 3 | ... | 0.1 | 4,905,546 | 5,985,586 | 1,080,040 | ... | ... | 23.1 | 1,878 | 2,443 | 565 | 23.2 |
| St. P. & Duluth | 3,297 | 3,297 | ... | ... | ... | 477,629 | 483,607 | 5,978 | ... | ... | 3.2 | 2,104 | 2,174 | 70 | 3.2 |
| St. P., Minn. & Man. | 1,397 | 1,357 | 40 | ... | 2.9 | 3,121,028 | 3,684,951 | 563,923 | ... | ... | 15.3 | 2,234 | 2,716 | 482 | 17.9 |
| Total 4 roads... | 6,871 | 6,175 | 696 | ... | 11.3 | 11,557,037 | 12,262,188 | 1,254,783 | ... | ... | 5.7 | 1,682 | 1,980 | 304 | 15.3 |
| Total inc. or dec. | ... | ... | 696 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 304 | ... |

SOUTHWESTERN ROADS.

| | | | | | | | | | | | | | | | |
|----------------------|-------|-------|-------|-------|-------|-----------|-----------|---------|---------|-------|-------|-------|-------|-------|-------|
| Ft. Worth & Den.. | 144 | 121 | 23 | .... | 19.0 | 210,840 | 231,052 | ..... | 23,212 | 9.9 | 1,464 | 1,934 | .... | 470 | 24.6 |
| Gulf, Col. & S. F. | 536 | 536 | ..... | ..... | ..... | 589,905 | 770,475 | ..... | 181,570 | 23.6 | 1,099 | 1,437 | .... | 338 | 23.3 |
| K. C. F.T.S. & Gulf. | 389 | 389 | ..... | ..... | ..... | 1,255,004 | 1,165,337 | 89,757 | ..... | 7.7 | 3,226 | 2,906 | 230 | ..... | 7 |
| Kan. C. Spr. & Mem | 282 | 282 | ..... | ..... | ..... | 834,248 | 537,709 | 296,530 | ..... | 55.1 | 2,958 | 1,907 | 1,051 | ..... | 55 |
| Missou. Kan. & Tex | 2,211 | 2,211 | ..... | ..... | ..... | 2,902,742 | 3,322,615 | ..... | 419,873 | 12.6 | 3,131 | 1,503 | ..... | 190 | 12 |
| St. L. Ft. S. & W. | 193 | 160 | 33 | ..... | 20.6 | 1,88,086 | 233,337 | 54,749 | ..... | 23.5 | 1,403 | 1,458 | 35 | ..... | 2 |
| St. L. & San Fran. | 804 | 754 | 50 | ..... | 6.6 | 1,978,466 | 2,128,782 | ..... | 146,313 | 6.9 | 2,482 | 2,819 | ..... | 357 | 12 |
| St. Louis & Mem. | 735 | 735 | ..... | ..... | ..... | 435,330 | 369,607 | 74,723 | ..... | 26.5 | 596 | 495 | 101 | ..... | 20 |
| Vicks., Sh. & Pac. | 170 | 105 | 65 | ..... | 61.9 | 153,516 | 59,145 | 94,173 | 159.6 | 902 | 593 | 339 | ..... | 60 | 60 |
| Total, 9 roads.... | 5,464 | 5,293 | 171 | ..... | ..... | 8,651,032 | 8,812,059 | 609,941 | 770,968 | ..... | 1,583 | 1,665 | ..... | 82 | ..... |
| Total inc. or dec. | ..... | ..... | 171 | ..... | 3.2 | ..... | ..... | ..... | 161,027 | 1.8 | ..... | ..... | ..... | 89 | ..... |

a public trial of automatic freight-car couplers at Buffalo, N. Y., on Tuesday, Sept. 15, 1885.

The Executive Committee will be guided by the results of their trial in recommending several forms of couplers to the railroad companies for further test in actual service. They will watch the behavior of those selected couplers until one month prior to the next convention of the Association, when they will prepare a report, and may recommend for universal adoption one or more different forms of automatic freight-car couplers.

All parties desirous of presenting freight-car couplers to the consideration of the Master Car-Builders' Association are invited to participate in this trial.

The following requirements must be complied with:

The couplers must be attached to each end of two freight cars—preferably box cars; both cars must be forwarded, freight prepaid, to J. S. Hammond, Agent, New York, Lake Erie & Western Railroad, Buffalo, N. Y. Full drawings and specifications together with letters-patent, and any opinions on the device that may have been given by the Eastern or Western Railroad Association, or by the courts, and also a statement of the numbers and initials of cars equipped with the coupler and already in service, must be forwarded to the Executive Committee of the Master Car-Builders' Association, care of F. M. Wilder, Superintendent of Motive Power, New York, Lake Erie & Western Railroad, Buffalo, N. Y., prior to Sept. 15.

The Committee will not consider or investigate the merits of couplers represented only by models, drawings or other descriptions. An imperative condition of the trial will be that couplers submitted to the Committee must be applied to two cars so that they can be tested at the time and place named.

The Executive Committee is not prepared to assist inventors or owners of patents on car couplers in procuring cars to be equipped and delivered at Buffalo ready for trial. Negotiations of this character must be conducted directly between the owners of the couplers and the railroad companies. It will also be necessary for parties furnishing cars for this trial to arrange direct with the railroad companies for their return.

Notice of intention to take part in the trial, giving the numbers and initials of the two cars that will be forwarded, should be addressed to Edward B. Wall, Columbus, O., or to M. N. Forney, 73 Broadway, New York, who will also answer inquiries with reference to the proposed trials.

Railroad commissioners of the various states will be invited to be present at this trial. By order of the Executive Committee. M. N. FORNEY, Secretary.

Appliance for the Control of Natural Gas.

We recently witnessed a test and saw in practical operation a new tank regulator or governor for natural gas, the invention of Mr. A. W. Cadman, of Duquesne Way, Pittsburgh. This governor is so constructed that it will take the gas from the large mains at any pressure, and reduce it to a few ounces per square inch, or any pressure required in the use of the gas, and should the flow of the gas in the main cease for a moment at any time two valves automatically close between the main and burners, and a safety valve in connection with the pipes leading to the fires is thrown open, thus allowing all the gas in the service pipes to escape; and when the pressure in the main is turned on again, no gas can enter the building until the engineer in charge opens the valves automatically closed when the flow of gas ceased. To make this more safe, the valves are so arranged that they will not operate and allow any gas to go into the pipes in the building until the person in charge has closed every burner, as the slightest leak anywhere in the service pipes throughout the building is sufficient to prevent the machine from operating the valves and allowing the gas to enter the main building. As soon as the burners are all closed the engineer, by opening a small valve, allows the gas to assume its normal pressure in the service pipes. This, acting through the tank automatically, closes the pressure-regulating valve and the little valve just opened, when the large valve leading from the main in the street may be opened and the fires relit. It may seem to some that to attain so many points of excellence this apparatus must necessarily be complicated and cumbersome, but the reverse is the case. It is simplicity itself, and it is so constructed that its action is both positive and reliable, and it cannot be gotten out of order.

Mr. A. W. Cadman has also recently had patents granted him on an improved method for the introduction of natural gas into buildings, dwellings, etc. This consists in carrying the supply pipe from the street mains up through or back of the main conductors on to the roof and there branching off to and passing down the chimneys leading to the fires. This method avoids carrying the gas into the cellars or through the house, and in case of any leak in the service pipes it passes off into the air without any possible danger of an explosion. This method also has the advantage of heating the gas to a high temperature before passing into the fire, thus increasing the combustion and heating effects of the gas. —Pittsburgh American Manufacturer.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

St. Paul, Minneapolis & Manitoba, annual meeting, at the office in St. Paul, Minn., Aug. 20.

Terre Haute & Indianapolis, special meeting in Terre Haute, Ind., Aug. 16.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Connecticut & Passumpsic Rivers, 2½ per cent., semi-annual, on the preferred stock, payable Aug. 1.

Danbury & Norwalk, 3 per cent., semi-annual, payable Aug. 15.

Detroit, Lansing & Northern, 2 per cent., semi-annual, on the preferred stock, payable Aug. 15. This company drops from 3½ to 2 per cent. on the preferred stock, and passes altogether on the common stock.

Kansas City, Fort Scott & Gulf, 4 per cent., semi-annual, on the preferred stock, payable Aug. 15, to stockholders of record on Aug. 6. No dividend is declared on the common stock.

New York, Providence & Boston, 2 per cent., quarterly, payable Aug. 10.

Rutland, 1 per cent., semi-annual, on the preferred stock, payable Aug. 1.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be as follows:

The Master Car-Painters' Association will hold its annual convention in Toronto, Ont., on Wednesday, Sept. 2.

The National Association of General Passenger & Ticket Agents will hold its next half-yearly meeting in New York, at 11 a. m., on Tuesday, Sept. 15.

The Brotherhood of Locomotive Firemen will hold its annual convention in Philadelphia, on Monday, Sept. 21.

The General Time Convention will meet at the Grand Pacific Hotel, in Chicago, on Thursday, Oct. 8.

The Southern Time Convention will meet at the National Railway Exchange, No. 46 Bond street, New York, on Wednesday, Oct. 14.

Western Association General Passenger and Ticket Agents.

Notice is given to members that the next regular meeting of this Association will be held at the Plankinton House in Milwaukee, Wis., at 11 a. m. on Wednesday, Aug. 12.

New England Railroad Club.

The New England Railroad Club and its friends will hold the annual excursion in Boston Harbor on Tuesday, Aug. 25, the steamboat leaving R. W. Wharf at 10 a. m. and returning about 9 p. m. Persons desiring to join in the excursion can procure tickets of Messrs. John Kent, No. 70 Kilby street; George W. Peck, No. 26 Beach street; F. M. Curtis, Old Colony Railroad office, and John M. Ford, Allston. The tickets, including collation, will be \$2 each.

The committee in charge will esteem it a favor if their friends will notify them promptly of their intentions, but not later than Aug. 17, in order that they may be able to make the necessary arrangements for the party. All friends of the club are cordially invited.

ELECTIONS AND APPOINTMENTS.

Aroostook Central.—The officers of this new company are: President, J. B. Hall, Presque Isle, Me.; Vice-President, Dr. J. Cary, Caribou, Me.; Secretary, A. C. Perry, Presque Isle, Me.; Treasurer, S. W. Matthews, Caribou, Me.

Chattanooga.—Mr. J. H. Northrup, Receiver of this road, acts as General Manager also. Mr. H. B. Butler is Auditor and General Freight and Passenger Agent. The office is at Ashland, Kentucky.

Cincinnati, Lebanon & Northern.—Mr. Henry J. Miller has been appointed Superintendent and Chief Engineer of this road, with office in Cincinnati.

Cincinnati, Van Wert & Michigan.—The following circular has been issued by Vice-President and General Manager J. M. C. Marble: "Mr. W. S. Matthias having tendered his resignation as General Freight Agent of this company and the same having been accepted, Mr. H. R. Johnston, late Assistant General Freight and Passenger Agent, has been appointed General Freight Agent of this company, with office at Van Wert, O."

Mr. Frank P. Jeffries has been appointed Assistant General Freight and Passenger Agent, to take effect Aug. 1.

Cleveland & Mahoning Valley.—This company, whose road is leased to the New York, Pennsylvania & Ohio, has elected Joseph B. Perkins, Wm. B. Sanders and John Todd directors for three years.

Colorado-Utah Association.—At the session of the Colorado-Utah Association, July 22, the following gentlemen were selected as arbitrators: Mr. William Duncan, General Freight Agent of the Ohio & Mississippi; Mr. Alexander McKay, General Freight Agent of the Michigan Central, and Mr. George H. Daniels, Commissioner of the Colorado Railway Association. They will award percentages for the period between Aug. 1 and Oct. 1.

Crookston, Minneapolis & Duluth.—The office of this new company is at Crookston, Minn. The officers are: T. B. Walker, President; John Cromb, Vice-President; Ansel Bates, Treasurer; W. D. Hurlbut, Secretary.

Duluth, Ada & Northern Dakota.—The office of this new company is at Ada, Norman County, Minn. The officers are as follows: Asahel H. Baker, President; D. H. Fisk, Vice-President; Fred Puhler, Secretary; Knute Larson, Treasurer; directors, Asahel H. Baker, D. H. Fisk, Fred Puhler, Knute Larson, John M. Martin, G. H. Myron, E. T. Salverson, Peter Herbrandson and J. V. Campbell.

Peoria, Decatur & Evansville.—The duties of the General Passenger Agent of this company will hereafter be performed by General Traffic Manager H. E. Parker, and communications should be addressed accordingly.

Rome & Carrollton.—Mr. Hines M. Smith has been appointed Assistant Chief Engineer, with office in Rome, Ga., and will have charge of construction.

Toledo, Cincinnati & St. Louis.—The following, from Receiver John McNulta, is dated Toledo, July 28:

"E. P. Murray having resigned as General Superintendent, W. H. Pettibone is hereby appointed General Superintendent in his stead, to take effect Aug. 1, and will control and direct the operation of the road. All officers, agents and employees will follow such directions as he may give."

Mr. Pettibone issues the following circular under date of Aug. 1:

"Mr. C. C. Jenkins has this day been appointed General Freight and Passenger Agent, to succeed A. H. Snider, General Freight Agent, resigned, and C. S. Anthony, General Passenger and Ticket Agent, who will hereafter devote his time to the duties of Auditor."

Union Pacific.—The President has appointed Frederick R. Coudert, of New York, and Marcus W. Hanna, of Ohio, government directors in this company, in place of Francis Kernan and L. B. Harrison, declined.

Wilmington, Clinton & Point Caswell.—Mr. E. W. Kerr, of Clinton, N. C., has been chosen President, and A. Adrian, of Wilmington, N. C., Vice-President.

PERSONAL.

—Mr. F. H. Oliphant has resigned his position as General Manager of the Chattahoochee Railroad.

—Mr. S. M. Miller has resigned his position as General Passenger Agent of the Peoria, Decatur & Evansville road.

—Mr. W. S. Matthias has resigned his position as General Freight Agent of the Cincinnati, Van Wert and Michigan road.

—Mr. John B. Carson has declined the position of General Manager of the Florida Railway & Navigation Co., which was recently offered him.

—Mr. H. R. Duval has been offered the position of General Manager of the Florida Railway & Navigation Co., but has not yet accepted. He was formerly on the Erie road.

—Peter S. Colby, for some time past Paymaster of Morgan's Louisiana & Texas road, was arrested in New Orleans, July 30, on the charge of embezzling funds of the company. He admitted a defalcation, which is said to amount to about \$11,000, although it is feared that it will exceed that amount.

—Mr. Samuel W. Miffin, one of the oldest American civil engineers, died at his residence in Wayne, Pa., July 25. Mr.

Miffin retired from active business a number of years ago, but in early life he was prominently and creditably connected with the Pennsylvania Canal and a number of the earlier railroads in Pennsylvania.

—Captain John Postell, recently General Manager of the East & West Railroad of Alabama, has sued that company for damages. He claims that the company was under contract to retain his services until the road should be completed to Birmingham, and he not only asks for damages for his discharge, but also sues to recover \$40,000 which he has invested in the road.

—Mr. Chauncy S. Colton died at his home in Galesburg, Ill., July 28, aged 85. Mr. Colton settled in Illinois many years ago, and some thirty years ago became interested in several small lines then under construction in the central part of that state, among which were the Northern Cross, the Peoria & Oquawka and the Central Military Tract road. Mr. Colton secured the consolidation of these lines, and shortly afterward the organization of the Chicago, Burlington & Quincy Co. He was one of the first directors of that company, and served upon the board for over 20 years, retiring finally on account of ill health. He was associated with Messrs. John M. Forbes and James F. Joy, in securing the construction of a number of branches of the Burlington road, and took an active part in the management of the company until his final retirement.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Seven months to July 31:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|---------------------|-------------|-------------|--------------|-------|
| Chicago & Alton. | \$4,337,772 | \$4,645,207 | D. \$307,435 | 6.8 |
| Chi. & East. Ill. | 856,587 | 816,766 | I. 39,821 | 4.9 |
| Chi., Mil. & St. P. | 12,509,000 | 12,376,734 | I. 132,266 | 1.0 |
| Chi. & Nor. West. | 12,713,310 | 12,644,727 | I. 68,583 | 0.5 |
| Long Island. | 1,542,319 | 1,503,311 | I. 39,008 | 2.6 |
| Louis. & Nash. | 7,857,591 | 7,610,254 | I. 247,337 | 3.3 |
| Mil., L. S. & W. | 689,916 | 630,648 | I. 59,268 | 4.8 |
| Mil. & Northern. | 318,969 | 255,263 | I. 63,706 | 8.0 |
| Northern Pacific. | 5,605,278 | 7,008,024 | D. 1,402,746 | 20.0 |
| St. L. & San F. | 2,304,553 | 2,483,687 | D. 179,134 | 7.9 |

Six months to June 30:

| | | | | |
|---------------------|-------------|-------------|--------------|-------|
| Atch., T. & S. F. | \$7,227,256 | \$7,646,815 | D. \$419,559 | 5.5 |
| Net earnings. | 3,114,919 | 3,535,940 | D. 421,021 | 11.9 |
| Canadian Pacific. | 3,352,827 | 2,098,044 | I. 1,254,783 | 59.8 |
| Net earnings. | 1,113,361 | 990,822 | I. 122,539 | 11.0 |
| Chi., Bur. & Q. | 12,377,967 | 11,610,021 | I. 767,946 | 6.3 |
| Net earnings. | 5,155,640 | 5,158,970 | D. 3,324 | 0.1 |
| L. Rock & Ft. S. | 245,284 | 236,945 | I. 8,339 | 3.6 |
| L. R., M. R. & T. | 145,176 | 15,104 | D. 6,988 | 4.6 |
| Louis. & Nash. | 6,833,856 | 6,556,245 | I. 277,611 | 4.2 |
| Net earnings. | 2,640,667 | 2,254,480 | I. 386,187 | 17.1 |
| N. Y., L. E. & W. | 8,657,167 | 9,471,511 | D. 814,344 | 8.6 |
| Net earnings. | 1,604,435 | 1,536,414 | I. 133,021 | 8.7 |
| N. Y. & N. England. | 1,513,945 | 1,587,859 | D. 73,914 | 4.7 |
| Net earnings. | 438,454 | 293,634 | I. 144,820 | 49.2 |
| Ohio & Miss. | 1,738,415 | 1,763,967 | D. 25,552 | 3.0 |
| Net earnings. | 384,715 | 186,211 | I. 198,504 | 108.8 |
| Union Pacific. | 11,224,530 | 10,993,817 | I. 230,713 | 2.1 |
| Net earnings. | 3,274,686 | 3,359,724 | D. 85,038 | 2.5 |
| West Jersey. | 510,794 | 527,509 | D. 16,715 | 3.2 |
| Net earnings. | 184,881 | 185,212 | D. 331 | 0.2 |

Five months to May 31:

| | | | | |
|---------------------|-------------|-------------|------------|------|
| Gal., H. & San. | \$1,167,223 | \$1,167,380 | D. \$160 | ... |
| Net earnings. | 518,402 | 261,772 | I. 256,630 | 98.0 |
| Louisiana West. | 244,434 | 213,157 | I. 31,277 | 14.7 |
| Net earnings. | 127,988 | 94,790 | I. 33,198 | 34.9 |
| Morgan's La. & Tex. | 1,603,423 | 1,427,938 | I. 175,485 | 12.3 |
| Net earnings. | 520,202 | 426,043 | I. 94,159 | 22.1 |
| Tex. & N. Orls. | 375,619 | 379,588 | D. 3,969 | 1.0 |
| Net earnings. | 158,601 | 160,990 | D. 2,389 | 2.6 |

Month of May:

| | | | | |
|---------------------|-----------|-----------|-------------|-------|
| Gal., H. & San A. | \$255,096 | \$217,793 | I. \$37,303 | 17.1 |
| Net earnings. | 125,811 | 58,806 | I. 67,005 | 130.9 |
| Louisiana West. | 44,729 | 34,024 | I. 10,705 | 31.5 |
| Net earnings. | 22,254 | 17,494 | I. 4,760 | 27.2 |
| Morgan's La. & Tex. | 293,932 | 236,526 | I. 57,406 | 24.2 |
| Net earnings. | 63,779 | 41,445 | I. 22,334 | 54.7 |
| Tex. & N. Orls. | 75,701 | 62,253 | I. 13,448 | 21.7 |
| Net earnings. | 33,301 | 26,666 | I. 6,635 | 24.6 |

Month of June:

| | | | | |
|---------------------|-------------|-------------|-------------|------|
| Atch., T. & S. F. | \$1,218,772 | \$1,254,029 | D. \$35,257 | 2.8 |
| Net earnings. | 557,337 | 452,496 | I. 104,841 | 13.2 |
| Canadian Pac. | 734,862 | 550,661 | I. 184,201 | 33.7 |
| Net earnings. | 283,491 | 151,631 | I. 131,860 | 86.7 |
| Ches. & Ohio. | 249,521 | 257,261 | D. 7,740 | 3.0 |
| Net earnings. | 59,686 | 66,354 | D. 6,668 | 8.5 |
| Ches., O. & S. W. | 113,361 | 94,276 | I. 19,085 | 20.3 |
| Net earnings. | 29,012 | 17,096 | I. 11,916 | 70.1 |
| Chi., Bur. & Q. | 1,992,484 | 2,077,182 | D. 84,698 | 4.1 |
| Net earnings. | 768,267 | 1,012,741 | D. 244,474 | 23.1 |
| Eliz., Lex. & B. S. | 52,761 | 58,055 | D. 5,294 | 9.3 |
| Net earnings. | 20,078 | 17,328 | I. 2,750 | 16.0 |
| Fr. Worth & Den. | 57,787 | 30,121 | I. 18,666 | 47.8 |
| Net earnings. | 15,496 | 15,496 | D. 0 | 0.0 |
| G. B., W. & St. P. | 30,166 | 24,631 | I. 5,535 | 22.2 |
| Net earnings. | 3,773 | 4,346 | D. 573 | 15.1 |
| Kentucky Cent. | 62,249 | 68,575 | D. 6,326 | 9.2 |
| Net earnings. | 17,093 | 21,471 | D. 4,378 | 20.5 |
| L. Rock & Ft. S. | 31,956 | 30,985 | I. 971 | 3.1 |
| L. R., M. R. & T. | 17,745 | 22,908 | D. 5,163 | 22.4 |
| Louis. & Nash. | 1,038,171 | 1,032,559 | I. 5,612 | 0.5 |
| Net earnings. | 367,282 | 394,288 | D. 27,006 | 6.8 |
| N. Y., L. E. & W. | 1,451,933 | 1,569,507 | D. 117,574 | 7.5 |
| Net earnings. | 315,523 | 312,755 | I. 2,768 | 0.9 |
| N. Y. & N. England. | 271,087 | 283,530 | D. 12,443 | 4.4 |
| Net earnings. | 81,307 | 68,167 | I. 13,140 | 19.3 |
| Ohio & Miss. | 264,201 | 257,135 | I. 7,066 | 2.7 |
| Net earnings. | 71,865 | 43,440 | I. 28,425 | 65.6 |
| Union Pacific. | 1,955,395 | 1,730,453 | I. 224,942 | 12.4 |
| Net earnings. | 400,480 | 518,878 | D. 118,398 | 22.8 |
| West Jersey. | 111,048 | 112,374 | D. 1,326 | 1.2 |
| Net earnings. | 49,156 | 33,009 | I. 16,147 | 48.9 |

Month of July:

| | | | | |
|---------------------|-----------|-----------|-------------|------|
| Chi. & Alton. | \$707,291 | \$724,619 | D. \$17,328 | 2.4 |
| Chi. & East. Ill. | 112,707 | 128,394 | D. 15,687 | 12.2 |
| Chi., Mil. & St. P. | 1,894,000 | 1,949,545 | D. 55,545 | 2.8 |
| Chi. & Nor. West. | 2,074,000 | 1,976,100 | I. 97,900 | 5.0 |
| Long Island. | 372,889 | 368,335 | I. 4,554 | 1.2 |
| Louis. & Nash. | 1,051,335 | 1,054,109 | D. 2,774 | 0.3 |
| Mil., L. S. & W. | 112,603 | 104,609 | I. 7,994 | 7.3 |
| Mil. & Northern. | 45,901 | 42,348 | I. 3,553 | 7.8 |
| Northern Pacific. | 990,732 | 1,022,438 | D. 31,706 | 2.2 |
| St. L. & San F. | 324,900 | 367,900 | D. 43,000 | 11.9 |

* Deficit.

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Coal.

Coal tonnages for the week ending July 25 are reported as follows:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|-------------------------|---------|---------|--------------|-------|
| Anthracite | 698,828 | 921,517 | D. 222,689 | 24.1 |
| Eastern bituminous..... | 174,198 | 185,377 | D. 11,179 | 6.0 |
| Coal | 40,747 | 51,619 | D. 1,872 | 3.6 |

Anthracite tonnages for the seven months to Aug. 1, as given by the weekly statements of the companies, have been as follows for eight years past:

| | Tons. | 1881 | Tons. | 1881 |
|------|------------|------|------------|------|
| 1885 | 16,139,689 | 1881 | 14,316,439 | |
| 1884 | 16,290,819 | 1880 | 11,509,280 | |
| 1883 | 16,926,705 | 1879 | 13,898,602 | |
| 1882 | 15,218,926 | 1878 | 8,498,437 | |

This year's tonnage, it will be seen, has very nearly reached that of last year. It is some 5 per cent. below that of 1883, but exceeds the output reported for any year previous to 1883 by a considerable amount.

Anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the seven months to Aug. 1 was:

| | 1885 | 1884 | Inc. or Dec. | P. c. |
|-----------------------------|---------|---------|--------------|-------|
| Coal Port for shipment | 45,855 | 51,020 | D. 5,125 | 10.0 |
| S. Amboy | 334,024 | 346,633 | D. 6,609 | 19.4 |
| Local points on N. J. divs. | 435,270 | 437,482 | D. 2,212 | 0.5 |
| Co.'s use | 127,628 | 105,136 | I. 22,492 | 21.4 |
| Total | 942,817 | 934,271 | I. 8,546 | 0.9 |

Of the total this year, 763,862 tons were from the Lehigh and 178,955 tons from the Wyoming Region.

Actual tonnage passing over the Huntingdon & Broad Top road for the seven months to Aug. 1 was:

| | 1885 | 1884 | Inc. or Dec. | P. c. |
|-----------------|---------|---------|--------------|-------|
| Broad Top coal | 94,313 | 110,668 | D. 16,355 | 14.8 |
| Cumberland coal | 265,090 | 257,845 | I. 7,245 | 2.8 |
| Total | 359,403 | 368,513 | D. 9,110 | 2.5 |

The Broad Top coal is mined on the line; the Cumberland carried through for the Pennsylvania Railroad.

Cotton.

Cotton movement for the eleven months of the crop year from Sept. 1 to July 31 is given by the *Commercial and Financial Chronicle* as follows, in bales:

| | 1885 | 1884 | Inc. or Dec. | P. c. |
|------------------|-----------|-----------|--------------|-------|
| Interior markets | 2,623,015 | 2,855,922 | D. 232,907 | 8.2 |
| Shipments | 2,619,652 | 2,827,771 | D. 208,119 | 9.1 |
| Stock, July 31 | 6,688 | 22,307 | D. 15,619 | 70.3 |
| Seaports | | | | |
| Receipts | 4,723,913 | 4,805,767 | D. 81,854 | 1.7 |
| Exports | 3,854,216 | 3,835,700 | I. 18,516 | 0.5 |
| Stock, July 31 | 214,485 | 213,769 | I. 716 | 0.3 |

It must be remembered that a considerable part of the shipments from interior markets appears again in the receipts at seaports.

The *Chronicle* says: "In the table below we give the receipts from plantations, and add to them the net overland movement to July 1, and also the takings by Southern spinners to the same date, so as to give substantially the amount of cotton now in sight:

| | 1884-85 | 1883-84 | 1882-83 | 1881-82 |
|---|-----------|-----------|-----------|-----------|
| Receipts at the ports to July 31 | 4,723,913 | 4,805,767 | 5,910,554 | 4,661,024 |
| Interior stocks on July 31 in excess of Sept. 1 | 3,363 | *26,849 | 41,401 | *20,979 |
| Total receipts from plantations | 4,927,276 | 4,778,918 | 5,981,955 | 4,640,045 |
| Net overland to July 1 | 605,598 | 573,693 | 637,698 | 494,336 |
| Southern consumption to July 1 | 261,000 | 292,000 | 318,000 | 229,000 |
| Total in sight, July 31 | 5,593,842 | 5,644,523 | 6,937,653 | 5,333,381 |

Northern spinners' takings to July 31

* Decrease from Sept. 1.

"It will be seen by the above that the decrease in amount in sight, as compared with last year, is 50,681 bales, the decrease from 1882-83 is 1,343,811 bales, and the increase over 1881-82 is 260,461 bales."

Watermelons.

The shipments of watermelons from stations on the Savannah, Florida & Western road this year amounted to 941 car loads, against 1,066 last year. About 20 per cent. of these shipments were to New York and about 70 per cent. to Western points, the remainder going to local Eastern points.

Missouri Commission Rates.

The Missouri Railroad Commissioners have issued a circular ordering that from and after Sept. 1 next, on all lines in Missouri, the total charges on coal, brick, stone, clay, cord wood, logs and iron ore shall not exceed 55 cents per ton for 10 miles or less distance, with 5 cents per ton for each additional 10 miles or fractional part thereof.

East-Bound Passenger Pool.

A meeting of the Chicago East-Bound Passenger Committee was held in Chicago, July 29, for the purpose of discussing the plan for pooling traffic prepared by the joint Agent Moore. The agreement was discussed at considerable length and all parties present favored its adoption, but the general view is said to have been that it would be hardly possible to realize full benefit from it unless the lines east of Buffalo and Pittsburgh should favor the plan. Mr. Moore was therefore requested to communicate with the managers of the Eastern trunk lines, submitting copies of the agreement, and asking whether they will become parties to it. It was decided to hold another meeting as soon as the replies could be received. It is understood that if those replies are favorable the agreement will be signed by all the Chicago roads.

Southern Railway & Steamship Association.

The meeting of the Executive Committee in New York last week closed July 30, when it was resolved to return to the old freight schedule, the Richmond & Danville Co. having withdrawn its opposition to the renewal of the agreement of the Association. It is also understood that the differences between the Louisville & Nashville and the East Tennessee lines have been settled by private agreement between these two companies.

It is understood that a plan is under consideration for extending the pool to passenger as well as freight business, and that the plan will shortly be ready to be submitted to the members of the Association. This pool on passenger business has been urged upon the Association by General Commissioner Powers for several years past, and at one time came very nearly being adopted.

Lake Superior Iron Ore.

Shipments of iron ore from the Lake Superior region up to July 29 are reported by the *Marquette Mining Journal* as below:

| | 1885 | 1884 | Inc. or Dec. | P. c. |
|------------|---------|-----------|--------------|-------|
| L'Anse | 19,138 | 38,102 | D. 18,964 | 47.1 |
| Marquette | 300,327 | 437,863 | D. 137,536 | 31.4 |
| Escanaba | 6,030 | 845,289 | D. 224,089 | 26.6 |
| St. Ignace | 38,117 | 32,696 | I. 5,421 | 16.4 |
| Total | 987,200 | 1,351,950 | D. 373,750 | 27.6 |

Of the Escanaba shipments 264,373 tons were from the Marquette District and 356,247 tons from the Menominee District. Pig-iron shipments were 1,430 tons from Marquette and 2,149 from St. Ignace, a total of 3,579 tons.

Buffalo Grain Traffic.

Buffalo grain receipts by lake from the opening of navigation up to July 31 were as follows for four years past, flour in barrels and grain in bushels, flour being reduced to wheat in the totals:

| | 1885 | 1884 | 1883 | 1882 |
|-------|------------|------------|------------|------------|
| Flour | 894,423 | 867,590 | 908,015 | 773,520 |
| Grain | 29,705,312 | 18,444,180 | 25,761,405 | 20,200,765 |

Total, bu. 25,177,427 22,782,430 30,301,480 24,128,410

For the same period shipments eastward of grain received by lake have been, in bushels:

| | 1885 | 1884 | 1883 | 1882 |
|----------|------------|------------|------------|------------|
| By canal | 12,537,013 | 13,138,451 | 17,648,462 | 11,474,992 |
| By rail | 5,988,090 | 4,269,494 | 5,593,586 | 4,676,320 |
| Total | 18,525,103 | 17,407,915 | 23,247,048 | 16,351,312 |

P. c. by rail. 32.3 24.5 24.1 29.8

The canal opened May 11 this year; May 7 in 1884; May 7 also in 1883, and May 11 in 1882.

Texas Traffic Association.

The general freight agents of the roads forming the Texas Traffic Association met in Galveston this week, with the intention of completing the details of the pool and arranging rates and divisions. On Aug. 4, however, the conference was abruptly broken up in consequence of a notice received from the Gulf, Colorado & Santa Fe Co. to the effect that the directors of that company had declined to ratify the pooling agreement, which was for five years, and that they would not approve of any agreement for more than one year. It was stated, however, that the directors would be willing to make an agreement for one year with the condition that it might be renewed at the end of that year in case it had worked satisfactorily. This postpones, for the present, the formation of the Texas pool, although it is probable that another conference may be called to see if a new agreement cannot be made.

Passenger Rates.

Cutting of passenger rates is reported from Cincinnati, and on Aug. 6 all the roads there were selling single tickets to New York at \$11 and round trip at \$18, with a prospect of further reductions.

RAILROAD LAW.

Regulating Rates in Massachusetts.

In the matter of the complaints against the Housatonic Railroad Co., the Massachusetts Railroad Commission have considered the objections made to their action under the special act, giving them authority to fix rates over that road, and have concluded to act under the law. With respect to the objections made that the Housatonic Co. is not a Massachusetts corporation, they state that there is no doubt that any company operating a line in Massachusetts becomes subject to Massachusetts laws, and that this principle is well settled and defined by the courts. The Commissioners say, in their decision:

"The act is said to be unconstitutional, so far as it relates to interstate commerce, and plausible arguments can be made in defence of this view. Such arguments have been made before, especially by Messrs. Evans, Lawrence and Stoughton in the great case of *Peck vs. Chicago & Northwestern Railway*, 94 U. S. 164. But the law of the land is to be found, not in the briefs of counsel on the losing side of a case, nor in the dissenting opinion of a minority, but in the decision as pronounced by the Court. And this decision, given by Chief-Justice Waite, sustains the constitutionality of a state law fixing a maximum of freight and passenger charges, including those brought into and those carried out of the state, but excepting freight merely in transit through the state. In this case the Chief-Justice said: 'These suits present the single question of the power of the Legislature of Wisconsin to provide a law for a maximum of charge to be made by the Chicago & Northwestern Railway Co. for fare and freight upon the transportation of persons and property carried within the state, or taken up outside the state and brought within it, or taken up inside and carried without.' (P. 175.)

"As to the effect of the statute as a regulation of interstate commerce: The law is confined to state commerce and such interstate commerce as directly affects the people of Wisconsin. Until Congress acts in reference to the relations of this company to interstate commerce, it is certainly within the power of Wisconsin to regulate its fares, etc., so far as they are acts of domestic concern. With the people of Wisconsin this company has domestic relations. Incidentally they may reach beyond the state. But certainly until Congress undertakes to legislate for those who are without the state, Wisconsin may provide for those who are within, even though it may indirectly affect those without.' (Pp. 177, 178.)

"While this decision is unreversed by the supreme tribunal by which it was made, it gives law to us, whatever may be said of it by any member of the bar or railroad manager, or by any state or United States circuit judge. It is the direct decision of the highest court upon a question of constitutional law."

OLD AND NEW ROADS.

Americus, Preston & Lumpkin.—Tracklaying on this road has been resumed at Hudson, 10 miles from Americus, Ga., and the work is being pushed, with the intention of having the line completed to Preston early in September.

Aroostook Central.—A preliminary organization of this company was made at a meeting held in Presque Isle, Me., Aug. 4. Other meetings are to be held to secure subscriptions to the stock of the company, whose road is to connect the Aroostook settlements with the New Brunswick and the Maine Central roads.

Atchison, Topeka & Santa Fe.—This company makes the following report for June and the six months to June 30:

| | June. | Six months. |
|--------------|-------------------------|-------------------------|
| Miles worked | 1885. 2,375 1884. 2,329 | 1885. 2,375 1884. 2,313 |
| Earnings | \$1,218,772 | \$1,254,039 |
| Expenses | 661,435 | 801,533 |
| Net earnings | \$557,337 | \$452,496 |

For the half-year the gross earnings decreased \$419,559, or 5.5 per cent., while the expenses increased \$1,452, the result being a decrease of \$421,011, or 11.9 per cent., in net earnings.

Baltimore & Ohio.—It is stated that this company has instructed its engineers to make a survey of a line from Bound Brook, N. J., to Jersey City. Under agreement with the Reading Co. it will have the use of the line from Philadelphia to Bound Brook as soon as the road is completed to Philadelphia, and proposes, according to this report, to build its own line into Jersey City in case terms cannot be made with the New Jersey Central. It is to be remembered, however, that, while it would be an easy matter to build a new line across New Jersey, it will be impossible to obtain terminal facilities in Jersey City, the whole water front being taken up by the existing companies.

Beech Creek, Clearfield & Southwestern.—Another meeting of the outside stockholders was held in Philadelphia, Aug. 3, to receive the report of the committee which had been sent to New York. After hearing the report the stockholders agreed to decline the proposition of the Pennsylvania Railroad Co. as contained in the circular issued to them. It is, however, admitted that these outside stockholders do not control a majority of the stock and that they cannot prevent the transfer of the controlling interest of the road. They may, however, make some trouble, and may possibly take the matter into the courts.

Boston & Lowell.—The *Boston Advertiser* says: "It is again reported (this time in Vermont) that the Boston & Lowell has acquired the Passumpsic stock owned by the Connecticut River road, and thus gets control of the Passumpsic road. The Boston & Lowell guarantees to pay 6 per cent. on the stock. It is also rumored that the Boston road is negotiating for the Southeastern, and is likely to get it. These reports are officially denied, but it is fair to say that a good many people believe they are only premature."

This company offers for subscription \$500,000 in new bonds, having 20 years to run from Sept. 1 next, at 4 per cent. interest. The subscription was closed Aug. 6. Bonds will be issued either as coupons or registered bonds.

Buffalo, New York & Philadelphia.—This company defaulted on the August interest on Warren & Franklin first-mortgage bonds. These bonds, \$1,500,000 in amount, are a first lien on 50 miles of the main line. The coupons are being purchased by the Philadelphia & Erie Railroad Co., that company having guaranteed them at the time the original road was built.

California Southern.—Work on the extension of this road from the present terminus at San Bernardino, Cal., to a junction with the Atlantic & Pacific is progressing steadily. A large part of the grading is finished, and track has been laid from the northern terminus at Waterman southward to the Willows, 16 miles. On the southern end construction trains are running to a point in the Cajon Pass, 14 miles from San Bernardino. The whole length of the extension will be about 80 miles, so that 50 miles of track are still to be laid. The most difficult part of the work, through the Cajon Pass, is substantially finished. The work on the iron bridge over the Mojave River near Arroyo Grande is nearly finished.

Canadian Pacific.—The earnings and expenses for June and for six months have been as follows:

| | June. | Six months. |
|--------------------|-------------------------|-------------|
| | 1885. 1884. 1885. 1884. | |
| Gross earnings | \$734,862 | \$550,681 |
| Operating expenses | 451,371 | 309,030 |
| Net earnings | \$283,491 | \$151,631 |

* Deficit.

For the six months the gross earnings increased \$1,254,783, or 59.8 per cent., and the expenses \$50,000, or 2.3 per cent., the result being a net gain of \$1,204,783, changing last year's deficit to a good surplus this year.

Central of New Jersey.—The Philadelphia & Reading Co. has filed its answer in the suit brought by this company to recover possession of its road. The answer generally denies that the company has failed to fulfill its obligations under the lease, and, on the other hand, claims that there are considerable amounts due it from the leased road for betterments made and for money advanced for the payment of car trusts and other obligations. The answer gives a detailed statement of the account between the two companies, which differs very materially from that filed with the Central Railroad complaint.

Default was made on \$175,000 coupons due Aug. 1 on first mortgage bonds of this company. Most of the bonds were held in large lots, and it is said that the bondholders proposed taking concerted action to secure payment. The Reading Receivers will continue to forward, from day to day, the net receipts from the leased line, in order that the Central Co. may make payments on account, but it is not known what action the Central will take in the matter.

Central Transportation Co.—The difficulty between this company and the Pullman Palace Car Co. is to be settled in the courts, the Central Transportation Co. having brought suit against the Pullman Co. to recover two quarterly payments of rental under the old contract, which the Pullman Co. claims has been abrogated. This suit will test the point whether the old contract is still in force.

Chateaugay.—Work is in progress on an extension of this road from the present terminus at Lyon Mountain, N. Y., westward 5 miles. The road is operated by the Chateaugay Iron Co., and is now 34 miles long, having its eastern terminus at Plattsburg, N. Y. A blast furnace is to be built at the new terminus.

Chautauqua Lake.—This company has filed articles of incorporation to build a railroad entirely around Chautauqua Lake, reaching all the points of resort on the lake and connecting with all the railroad lines running to it. The capital stock is to be \$500,000, of which \$460,000 are subscribed by Mr. Willard White, of Boston.

Chesapeake & Ohio.—The Governor of West Virginia has notified the prosecuting attorneys and the sheriffs of the counties through which this road runs to continue and enforce proceedings for the collection of the taxes claimed from the road by the state.

Chicago, Burlington & Quincy.—The following is from the circular relating to the proposition to build an independent connection with St. Paul:

"An organization is being formed by Mr. A. E. Touzalin and associates, to be called the Chicago, Burlington & Northern Railroad Co., the object of which is the construction of a railroad from Oregon, on the Chicago & Iowa Railroad, and Fulton, on our own line, to a junction at or near Savanna, in Carroll County, Ill., and thence up the east bank of the Mississippi River to St. Paul. A joint traffic contract will be made between the Chicago, Burlington & Quincy Railroad Co. and the Chicago & Iowa Railroad Co. on the one hand and the Chicago, Burlington & Northern Railroad Co. on the other, to run for 20 years, and providing that the Chicago, Burlington & Quincy and Chicago & Iowa companies shall devote one-half of their estimated net earnings annually on all business to and from the Chicago, Burlington & Northern to the purchase of Chicago, Burlington & Northern first-mortgage 5 per cent. bonds at not above 105 and accrued interest. The Chicago, Burlington & Quincy Railroad Co. guarantees that the amount annually invested in the purchase of bonds shall not be less than \$100,000.

"The length of the new road will be about 360 miles. The capital stock is fixed at 90,000 shares, and the bonds at \$9,000,000, or \$25,000 per mile of each. The bonds are to be dated Dec. 1, 1885, to run 40 years from April 1, 1886, to bear interest at the rate of 5 per cent. per annum after that date and to be secured by a first mortgage on the whole 360 miles of road. The Chicago, Burlington & Northern Railroad Co. reserves the right to redeem the whole issue at 105 on April 1, 1896.

"There have been disposed of by the projectors \$1,332,000 of the bonds and 14,172 shares of the Northern Co., and, in consideration of the purchase by the Chicago, Burlington & Quincy Railroad Co. of 30,000 shares of stock, an arrangement has been made by which the remaining 45,828 shares and \$7,638,000 of the first-mortgage 5 per cent. bonds of the Chicago, Burlington & Northern Railroad Co. are placed at the disposal of your directors.

"Chicago, Burlington & Northern bonds and stock will be sold together in blocks, each block consisting of one 5 per cent. first-mortgage bond for \$500 and three shares of full-paid stock of \$100 each, for which blocks \$555 in money shall be paid in installments, as follows: Oct. 1, 1885, 20 per cent.; Dec. 1, 1885, 20; April 1, 1886, 20; July 1, 1886, 20; Nov. 1, 1886, 20; average date, April 1, 1886.

"Holders of Chicago, Burlington & Quincy stock will be entitled to subscribe for one of the above blocks for each 50 shares (or rights) held.

"The books of this company will close at the close of business Aug. 15, 1885, and remain closed until the opening of business Aug. 25, 1885."

The company's statement for June and the six months to June 30 is as follows:

| | June. | 1884. | Six months. | 1884. |
|-------------------|-------------|-------------|--------------|--------------|
| Earnings..... | \$1,092,485 | \$2,077,182 | \$12,372,967 | \$11,616,021 |
| Expenses..... | 1,224,198 | 1,064,441 | 7,217,320 | 6,457,051 |
| Net earnings..... | \$768,287 | \$1,012,741 | \$5,155,647 | \$5,158,970 |

The half-year shows an increase of \$756,946, or 6.5 per cent., in gross earnings, with an increase of \$760,269, or 11.8 per cent., in expenses, the result being a decrease of \$3,323, or 0.06 per cent., in net earnings.

Chicago, Milwaukee & St. Paul.—A report comes from Chicago that this company is negotiating for the sale of its Chicago—Omaha line to the Union Pacific Co. The report is a somewhat doubtful one and needs confirmation.

Crookston, Minneapolis & Duluth.—This company has filed articles of incorporation in Minnesota to build a railroad from Crookston, by way of Leech Lake, to Duluth, with a branch from Leech Lake to Minneapolis.

Delaware & Hudson Canal Co.—This company makes the following statement for the leased railroad lines in New York for the quarter ending June 30:

| | 1885. | 1884. | Inc. or Dec. | P. c. |
|----------------------|-----------|-----------|--------------|-------|
| Gross earnings..... | \$556,099 | \$608,387 | D. | 8.1 |
| Operating expenses.. | 413,079 | 474,397 | D. | 12.9 |
| Net earnings..... | \$143,020 | \$133,989 | I. | 6.7 |
| Taxes and rentals... | 246,572 | 231,695 | I. | 6.4 |
| Deficiency..... | \$103,552 | \$97,705 | I. | 5.9 |

This statement includes the Albany & Susquehanna, the New York & Canada, the Rensselaer & Saratoga, the Rome & Clinton and the Utica, Clinton & Binghamton roads.

Denver & Rio Grande.—Mr. George Coppel, Chairman of the bondholders' committee, who has been making an inspection of the road, reports that much improvement is still necessary to bring the road up to condition. This improvement can be made with the money to be raised by assessing the stockholders, and the improvements will be of a permanent nature, reducing the operating expenses. For the year since the Receiver has had charge, he says that \$286,300 have been expended in improvement of the road, and the net earnings, after deducting this amount, were about \$1,480,000, which is equal to the interest on the first-mortgage bonds and car trusts, and to about 4 per cent. on the consolidated bonds. There are no receiver's certificates outstanding, and the floating debt has been largely diminished.

Detroit, Grand Haven & Milwaukee.—A survey is being made for a branch of this road to run from Coopersville, in Ottawa County, Mich., to Muskegon, a distance of 25 miles.

Duluth, Ada & Northern Dakota.—This company has been incorporated in Minnesota to build a railroad from Ada in Norman County eastward to a connection with some road running directly to Duluth; and also from Ada westward to the Red River, and thence to Caledonia, Dak.

East Tennessee, Virginia & Georgia.—Under the settlement of this company's claims against the Knoxville & Ohio, which was recently authorized by the Court, it will be remembered that the Knoxville & Ohio Co. was to issue \$2,000,000 in bonds, and with the proceeds to procure and turn over to the East Tennessee Co. \$2,400,000 in Memphis & Charleston stock, with some other securities. This stock, it is understood, is the same stock which was bought some time ago for account of the East Tennessee Co., but has never been taken by that company on account of its financial difficulties. Its transfer will give the East Tennessee a controlling interest in the Memphis & Charleston and will put an end to the attempt to break the lease of that road. It is said, however, that the outside stockholders of the Memphis & Charleston will make an attempt to prevent this, and that it is possible that they can prevent the sale of a controlling interest, although they cannot stop the transfer of a large block of the stock.

Ellsworth, McPherson, Newton & Southwestern.—This company gives notice of the opening for traffic on Aug. 1 of its line from El Dorado, Kan., southwest to Newton, 35 miles. It will be operated in connection with the St. Louis, Fort Scott & Wichita road.

Fort Worth & Denver City.—This company's statement for June and the eight months of the fiscal year from Nov. 1 to June 30, is as follows:

| | June. | 1884. | Eight months. | 1884. |
|-------------------|----------|----------|---------------|-----------|
| Earnings..... | \$57,787 | \$39,121 | \$273,353 | \$266,981 |
| Expenses..... | 32,362 | 23,625 | 151,600 | 180,970 |
| Net earnings..... | \$25,425 | \$15,496 | \$121,753 | \$129,011 |

For the eight months the gross earnings decreased \$36,628, or 11.8 per cent., and the expenses \$29,370, or 16.2 per cent., leaving a decrease in net earnings of \$7,258, or 5.6 per cent. In 1884 the company worked 110 miles of road; in 1885 it worked 110 miles for six months and 144 miles for the remaining two months.

Georgia Midland.—Subscriptions continue to be received along the line to the stock of this road, which is to extend from Columbus, Ga., to Atlanta. The amount secured is now considerable, sufficient, it is thought, to secure the construction of this road.

Georgia Pacific.—It is stated that arrangements are being made to resume work on the gap in the main line of this road west of Birmingham, Ala., and it is said that funds have been provided for its completion, so that there will be no further suspension of work.

Housatonic.—The Massachusetts Railroad Commissioners, in accordance with the act recently passed by the Massachusetts Legislature, and after having given a hearing to all parties concerned, have issued an order fixing the maximum rates to be charged on freight over this road between stations

in Massachusetts. The rates fixed are on coal, paper stock and other heavy freights used by the manufacturers on the line, and the reductions made are substantially those asked for by the manufacturing concerns which are served by the road. This is the first time the Commission has ever fixed freight rates, and, indeed, it is the first time it has had the power to do so, the right to fix rates over the Housatonic road having been conferred upon it by a special act of the Legislature, passed last spring, in consequence of the continued refusal of the company to give the manufacturers on its line the reductions recommended by the Commission. It is said that the company will appeal to the courts, claiming that the act is unconstitutional.

Intercolonial.—From Aug. 1 this company will own and run the sleeping cars on its line. This service has heretofore been under the control of the Pullman Co.

Kansas & Gulf Short Line.—Since March 1 last this company has extended its track 15 miles southward from last year's terminus. It has now a force of 300 men engaged in building the road, and expects to have it completed to a junction with the Houston, East & West Texas road by Oct. 1. In connection with the Texas & St. Louis this will complete a narrow-gauge line from St. Louis to Houston, Tex.

Knoxville, Sevierville & Pigeon River.—A survey has been completed for this road from Bruce station on the Knoxville & Augusta road, 5 miles from Knoxville, Tenn., by way of Shook's Gap, the Long Branch Valley and Big Pigeon River, to the crossing of the North Carolina Division of the East Tennessee road near Newport. The length of this line is 58½ miles, and the Engineer reports that the road can be built at a moderate cost, no heavy work being required. The heaviest grade will be 68½ ft. to the mile, and only 3 bridges of any size will be required. The road, it is claimed, will reach several valuable deposits of coal and iron ore and will open up a country heavily timbered with hard wood.

Lebanon Springs.—This road was recently sold at foreclosure sale and was bought by parties who were understood to represent the bondholders, and who intended to organize a company which should consolidate this road and the Bennington & Rutland. In Albany last week a motion was made on behalf of the creditors of the road, asking that the Court instruct the Receiver to close up the business and compel the purchasers to pay the money in accordance with the terms of sale. Petitioners represented that the purchasers had not complied with the terms of sale, and that in the meantime their claims were depreciating, and they further charged that the Receiver was acting in collusion with the purchasers. The petitioners represent that they would be willing to take charge of the road and operate it themselves rather than to be kept longer out of their money. The Court ordered that the purchasers must comply with the terms of sale by Aug. 12, and that, in default of the payment of the full amount due by that time, the road was again to be put up for sale by the Receiver.

Louisville, Evansville & St. Louis.—At a meeting of the first-mortgage bondholders held in Louisville, Ky., a committee was appointed consisting of Messrs. George W. Norton, James B. Wilder and A. L. Schmidt, to devise some plan for the protection of those bondholders in the approaching foreclosure and sale.

Louisville & Nashville.—This company's statement for June and the fiscal year ending June 30 is as follows:

| | June. | 1884. | Year. | 1883-84. |
|---------------|-------------|-------------|--------------|--------------|
| Earnings..... | \$1,038,171 | \$1,032,341 | \$13,941,076 | \$14,351,092 |
| Expenses..... | 670,879 | 638,070 | 8,182,253 | 8,823,782 |

Net earnings. \$367,292 \$394,271 \$5,758,823 \$5,527,310
For the year the gross earnings show a decrease of \$410,016, or 2.8 per cent., and the expenses a decrease of \$641,529, or 7.3 per cent.; the result being a net gain of \$231,513, or 4.2 per cent. An estimate (not official) puts all charges and expenditures for additions to property at \$5,570,000, leaving a surplus of \$188,823 for the year.

Memphis, Selma & Brunswick.—The United States Circuit Court at Oxford, Miss., has decided in favor of Monroe County, Miss., in the suits to enforce payment of subscription made by the county to the old Salem, Marion & Memphis road, of which this company is successor. The Court holds that the issue of county bonds was illegal and the subscription was void.

Mexican Railroad Notes.—The following notes are from the Mexican Financier of July 25:

It is stated that the Government is discussing plans for the completion of the Tehuantepec Railroad, of which some 125 kilometers have been built. A rather doubtful addenda to this report is that Mr. Delin Sanchez, the contractor for the completion of the road, is only awaiting the action of the government regarding the preservation of the track already built in order to continue the work of construction from his own resources.

It is currently reported that Mr. Edward W. Jackson, of the Mexican Railway, who has been appointed General Manager of the Central road, to succeed Mr. Robinson, will assume the duties of his new office about Oct. 1, and that, previous to his assumption of power, several important changes will be made in the official staff of the company. President Wade's coming visit is understood to be partly for the purpose of conferring with the General Manager elect.

We have received the report of the board of directors of the Chihuahua, Hidalgo & Sierra Madre Railway, of which Gen. Carlos Pacheco, Minister of Public Works, is President. The report states that the work undertaken by the company is of great magnitude and will have to be accomplished slowly. The board proposes to the stockholders that a final term of three months be given for the payment of the first assessment for subscribed stock, at the expiration of which term the stock book shall be finally closed. The financial part of the report shows assets to the amount of \$78,802, of which \$88,489 is in cash, and the remainder consists of tools, engineering implements, telegraph wire, masonry and track built. The report shows 49 kilometers of road built, but not yet provided with rails.

Missouri Pacific.—Much discontent is reported among the employes of this road and a strike is threatened. The complaint is that the shopmen are required to work overtime without receiving extra pay, which is contrary to the agreement with the company.

New York, Chicago & St. Louis.—The Receiver reports that from the date of his appointment up to June 30 the total receipts from all sources were \$1,245,127. The disbursements on all accounts, including payments of claims authorized by the court, have been \$1,092,473, leaving a cash balance of \$152,654 on hand.

New York, Lake Erie & Western.—It is reported that this company is negotiating with the New York, Chicago & St. Louis for the use of its road as a Chicago connection, the object being to dispense entirely with the use of the Chicago & Atlantic road.

This company's statement for June and the nine months of the fiscal year from Oct. 1 to June 30 is as follows, including

68 per cent. of earnings and the entire working expenses of the leased New York, Pennsylvania & Ohio Railroad:

| | June. | 1884. | Nine months. | 1883-84. |
|---------------|-------------|-------------|--------------|--------------|
| Earnings..... | \$1,451,933 | \$1,569,568 | \$13,790,729 | \$15,887,207 |
| Expenses..... | 1,136,410 | 1,256,813 | 10,664,282 | 12,578,005 |

Net earnings.... \$315,523 \$312,755 \$3,126,447 \$3,309,202
For the nine months the gross earnings decreased \$2,087,478, or 13.1 per cent., and the expenses \$1,913,723, or 15.2 per cent., leaving a decrease of \$173,755, or 5.2 per cent., in net earnings.

The following statement is also made for the Erie lines proper, excluding the earnings and working expenses of the New York, Pennsylvania & Ohio road:

| | June. | 1884. | Nine months. | 1883-84. |
|---------------|-------------|-------------|--------------|--------------|
| Earnings..... | \$1,202,186 | \$1,281,157 | \$11,239,552 | \$12,893,625 |
| Expenses..... | 639,426 | 920,529 | 7,866,931 | 9,262,465 |

Net earnings. \$562,760 \$360,628 \$3,372,621 \$3,631,160
Here the gross earnings for the nine months show a decrease of \$1,654,079, or 12.8 per cent., and the expenses a decrease of \$1,275,534, or 13.8 per cent., the result being a decrease in net earnings of \$378,539, or 10.4 per cent.

A comparison of the two statements shows that for the nine months of the current year the 68 per cent. of the gross earnings of the leased road amounted to \$2,560,177, while its expenses were \$2,677,351, showing a direct loss of \$117,174 on the lease; against a corresponding loss of \$321,958 last year.

New York & New England.—The Receiver's statements give the following figures for June and the nine months of the fiscal year from Oct. 1 to June 30:

| | June. | 1884. | Nine months. | 1883-84. |
|---------------|-----------|-----------|--------------|-------------|
| Earnings..... | \$271,457 | \$283,530 | \$2,314,370 | \$2,479,352 |
| Expenses..... | 189,750 | 215,363 | 1,650,651 | 2,156,449 |

Net earnings..... \$81,707 \$68,167 \$663,719 \$322,903
For the nine months there was a decrease in gross earnings of \$164,876, or 6.6 per cent., and a decrease in expenses of \$505,798, or 23.5 per cent.; the result being a gain of \$340,922, or 108.2 per cent., in net earnings.

New York, Pennsylvania & Ohio.—Argument is in progress this week in the United States Circuit Court in Pittsburgh on a motion to remove the McHenry suits against the company from the state to the federal courts, and also to vacate the order of the state court appointing a receiver. A large number of counsel are present and the arguments are expected to take up several days.

New York, Rutland & Montreal.—This company has been organized for the purpose of purchasing and consolidating the Lebanon Springs Railroad and the Bennington & Rutland road, forming a continuous line from a junction with the New York & Harlem at Chatham Four Corners, N. Y., to Rutland, Vt. This consolidation, if carried out, will revive the former consolidation under which these roads were united under the title of the Harlem Extension Railroad. The new company has executed a mortgage to cover an issue of bonds at the rate of \$25,000 per mile.

New York, West Shore & Buffalo.—A large amount of the first mortgage bonds has been turned in to Drexel, Morgan & Co., under the proposed agreement of reconstruction. How many of the bonds have been received the firm declines to state, but it is currently reported that they have already received more than a majority.

The New York Supreme Court has given a decision overruling the demurrer interposed in the foreclosure suit by the North River Construction Co. The Court holds that it was not essential to show that the bondholders had requested the trustee to begin suit.

Northern Pacific.—It is said that a movement is in progress among the stockholders to oppose the ratification of the proposed joint lease of the Oregon Railway & Navigation Co.'s property. So far this movement has hardly taken shape, but it is said that an effort will be made to unite all the stockholders who are inclined to oppose the lease, and who will very probably be represented by a committee.

This company has made contracts to ship a considerable number of cattle from Oregon and Washington Territory to Chicago and other Eastern points, which is comparatively a new traffic for this road.

Ogdensburg & Lake Champlain.—The New York Supreme Court will hear argument this week on the application to make permanent the temporary injunction granted on the suit of certain stockholders to prohibit this company from paying interest on the bonds of the Lamotte Valley Extension road. This road, it will be remembered, was built to connect the Ogdensburg & Lake Champlain with the St. Johnsbury & Lake Champlain, but has not been used since the former road fell under the control of the Central Vermont Co.

Ohio & Mississippi.—This company's statements give the following figures for June and the six months to June 30:

| | June. | 1884. | Six months. | 1884. |
|---------------|-----------|-----------|-------------|-------------|
| Earnings..... | \$264,201 | \$257,135 | \$1,738,415 | \$1,705,967 |
| Expenses..... | 192,306 | 213,695 | 1,352,700 | 1,609,697 |

Net earnings. \$71,895 \$43,440 \$384,715 \$186,210
For the half-year the gross earnings decreased \$57,492, or 3.2 per cent., and the expenses \$255,996, or 15.9 per cent.; the result being a gain of \$198,505, or 106.6 per cent., in net earnings.

Oregon & Transcontinental Co.—It is understood that a plan is on foot for funding the indebtedness of this company, which amounts to about \$11,500,000. It is thought that under present circumstances this plan could be successfully carried out and the company's debts put into a manageable form.

Quebec & Lake St. John.—The contractor on this road has now 1,200 men at work on the extension, and some 10 miles have already been completed. It is expected that 30 miles of the extension will be finished this year, reaching a point near Lake Edwards, 86 miles from Quebec. The road is now in operation from Quebec to Lake Simon, 57 miles. Its entire length to Lake St. John will be 175 miles.

Raleigh & Gaston.—This company has filed its answer in the suit recently begun by Mr. Addison, of Baltimore. The answer, in substance, denies all the allegations made in the complaint, and states that the road has not been operated in the interest of the Seaboard & Roanoke, or for any other road, but for what has been believed to be the best interest of the stockholders. It is claimed, also, that the purchase by the company of Carolina Central stock has been greatly to its benefit and has been a very profitable investment; and generally claims that the management has been proper and efficient, and that the only complaint that could possibly be made would be based on a difference in judgment as to what might be for the best interest of the company.

Reynoldsville & Falls Creek.—A contract for the construction of this road has been let to D. L. Miller and Frank Nearing, of Philadelphia, who are to complete the road this year. The line is to run from Reynoldsville, Pa., on the Rochester & Pittsburgh road, to Falls Creek, a distance of 7½ miles, and in that distance will reach a number of coal mines. It will be a branch of the Rochester & Pittsburgh road. No very heavy work is required, and the steep grade on the new line will be 17 ft. to the mile.

Ridgefield & New York.—This company is making an effort to secure subscriptions along the line for the construction of its proposed road from Danbury, Ct., to Portchester, N. Y. Some grading was done on the road a number of years ago and the right of way secured, and it is said that an expenditure of about \$350,000 will complete the line.

St. John Bridge.—The new bridge over the St. John River at St. John, N. B., was tested July 30, a train consisting of 4 locomotives and 20 loaded cars being run over and stationed at various points on the bridge while observations were taken. With the greatest possible strain under the weight of this train the greatest deflection at the centre of the span was 4 in. When the train was run over the bridge at a speed of 30 miles an hour there was no perceptible vibration. The work is being pushed as fast as possible on the approaches, and the time set for the opening of the bridge for traffic is Aug. 19, when a train will be run through from Boston to Halifax without change.

Shenango & Allegheny.—The United States Circuit Court has given a decision denying the petition of the first-mortgage bondholders for an order of foreclosure and sale under their mortgage. The Court says that the petition cannot be granted in its present form, or at the present time, for the reason that the fragmentary sale of the road would not be to the advantage of any of the parties in interest. The Court, however, in its opinion says that an early sale of the road is advisable and would be for the benefit of all the creditors provided the road is sold as a whole, and therefore recommends a vigorous prosecution of the bill for the foreclosure of the second mortgage. The sale under both mortgages would be free from the objections made to the present petition. The Court, therefore, dismisses the petition under the first mortgage and will make a decree and such orders as will be for the benefit of all parties in interest. It is understood that negotiations are now in progress for an amicable arrangement between the first and second-mortgage bondholders, under which the recommendations of the Court can be carried out and the road sold to satisfy both mortgages. The negotiations also cover a plan for the reorganization of the company.

Sinnemahoning Valley.—The grading of this road is now substantially completed, and track laying has been begun. The work will be pushed as fast as the rails and fastenings are received. The line runs from Keating Summit, Pa., on the Buffalo, New York & Philadelphia road, westward 7 miles. Its total length is to be 25 miles, but its extension will be gradual, as it is built to reach a large timber tract, and will be needed only as the cutting of timber advances.

Sonora.—The following statement of operations is made for this Mexican line, which is controlled by the Atchison, Topeka & Santa Fe:

| | June. | 1884. | 1885. | 1884. |
|---------------|----------|----------|-----------|-----------|
| Earnings..... | \$23,382 | \$16,686 | \$149,510 | \$113,072 |
| Expenses..... | 18,586 | 20,111 | 117,930 | 133,252 |

Net or deficit.... N. \$3,796 D. \$3,425 N. \$31,580 D. \$17,180

For the six months the gross earnings increased \$36,438, or 32.2 per cent., while the expenses decreased \$12,322, or 9.5 per cent., leaving a gain of \$48,760 in net earnings. The earnings and expenses are given in Mexican currency.

South Pennsylvania.—The Pittsburgh Chronicle-Telegraph says: "From a well-informed gentleman connected with the company, in another city, the writer obtained the following list of the original subscribers to the South Pennsylvania road:

| | June. | 1884. | 1885. | 1884. |
|---------------|----------|----------|-----------|-----------|
| Earnings..... | \$23,382 | \$16,686 | \$149,510 | \$113,072 |
| Expenses..... | 18,586 | 20,111 | 117,930 | 133,252 |

This list shows that the subscriptions of 10 residents of Pittsburgh aggregate \$6,500,000, a little less than one-half of the whole \$15,000,000. It was thought at one time that the entire Pittsburgh interest would hold out against any such transfer of the property as is proposed by Mr. Vanderbilt."

A dispatch from Philadelphia, Aug. 5, says: "President Robert H. Sayre, of the South Pennsylvania Railroad Co., was at Somerset to-day in conference with all the prominent contractors of the road, whom he had called together for the purpose. Mr. Sayre did not order the contractors to stop work, but he intimated to them plainly that he wished they would stop without orders. As there has been no stock issued, but simply an agreement among the members of the syndicate, who are not all in sympathy, and as legal complaints may arise, no one wants to take the responsibility of ordering the work stopped. The transfer of the control of the road to the Pennsylvania has to be cautiously done. The company has been expending about \$10,000 a day in building the road, but the force of men has been very largely reduced within the last few days. Some of the contractors told Mr. Sayre to-day they would act on his suggestion to stop work, provided they were paid for the work done up to date, so they could pay off their hands; but Mr. Sayre was not prepared to pay them on the spot."

"A prominent officer of the Pennsylvania Railroad Co. stated to-day that the only real opposition to the transfer of the South Pennsylvania Railroad to the Pennsylvania Co. was from Dr. Hostetter and Ralph Bagaley, of Pittsburgh, representing about \$2,500,000 of the subscriptions. The Pennsylvania Railroad Co. has been informed to-day by Mr. Vanderbilt's representative that both the Beech Creek and South Pennsylvania lines will be turned over within the time specified. The absolute surrender of proxies in the South Pennsylvania to Mr. Vanderbilt is \$9,800,000 out of the total of \$15,000,000."

Southwestern Colorado.—This company has been incorporated, with headquarters at Cimmaron, Montrose County, Colo., to build a railroad about 20 miles long, from Cero Summit to the south line of Montrose County.

Texas Trunk.—This road, which was recently sold at sheriff's sale for the fourth time, is again advertised to be sold by the United States Marshal in September next, to satisfy a judgment obtained in the United States Circuit Court

by New York creditors. The local stockholders, who bought the road at the recent sale, say that they will not oppose the new sale, but will bid in the road and thus obtain a clear title to the property.

Union Pacific.—This company's statement for June and the six months to June 30 is as follows, including all lines worked:

| | June. | 1884. | 1885. | 1884. |
|---------------|-------------|-------------|--------------|--------------|
| Earnings..... | \$1,955,305 | \$1,739,453 | \$11,224,530 | \$10,993,817 |
| Expenses..... | 1,554,915 | 1,230,575 | 7,949,844 | 7,634,093 |

Net earnings....\$400,480 \$518,878 \$3,274,686 \$3,359,724

For the six months the gross earnings increased \$230,713, or 2.1 per cent., and the expenses \$315,751, or 4.1 per cent., the result being a decrease in net earnings of \$85,038, or 2.5 per cent. A note attached to the statement says: "The unusually heavy expenses shown in this statement are due to the fact that the large amount of renewal and other track work which it has been the practice of the company heretofore to have done in the autumn months, was this year done in May, June, July and August. The burden of expense of operation has been shifted accordingly, largely affecting the comparative showing of the road during the months specified."

Vicksburg, Shreveport & Pacific.—The contractors are pushing work on the inclines for the steam ferry which is to connect this road with the Vicksburg & Meridian at Vicksburg.

A Vicksburg dispatch says that this company has made a contract by which all cotton from points on the road consigned to New Orleans is to be forwarded to that city by the Louisville, New Orleans & Texas road instead of by the Mississippi River boats, as heretofore. This cotton will be transferred across the river at Vicksburg, and the agreement will take effect as soon as the transfer ferry is in operation.

West Jersey.—This company's statement for June and the six months to June 30 is as follows:

| | June. | 1884. | 1885. | 1884. |
|---------------|-----------|-----------|-----------|-----------|
| Earnings..... | \$111,048 | \$112,374 | \$510,704 | \$527,369 |
| Expenses..... | 61,892 | 79,367 | 325,913 | 342,507 |

Net earnings....\$49,156 \$33,007 \$184,881 \$185,212
Interest and other charges.....123,150 125,574

Surplus.....\$17,735 \$36,648
This shows for the half year a decrease in gross earnings of \$16,715, or 3.2 per cent., and a decrease in expenses of \$16,384, or 4.8 per cent., leaving a decrease in net earnings of \$331, or 0.2 per cent. The charges decreased \$2,418, or 1.9 per cent., leaving an increase in surplus of \$2,087, or 3.5 per cent.

The leased West Jersey & Atlantic road (included above) in June earned \$17,990 gross and \$9,562 net. For the six months it earned \$59,578 gross and \$14,017 net; a decrease in net earnings of \$4,299, or 23.9 per cent.

Wilmington, Clinton & Point Caswell.—This company was recently reorganized and new officers chosen, who will, it is stated, go forward actively with the work of constructing the road, which has been suspended for some time. The projected line is from Clinton, in Sampson County, N. C., southward to Point Caswell on the Cape Fear River, a distance of about 40 miles. Of this line about 25 miles have been graded, leaving only 15 miles to be finished. The line is through a good country, which presents few or no obstacles, and the cost of grading has been comparatively slight.

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| Fort Worth & Denver City..... | 37 | Rome, Wat. & Ogdenburg..... | 479 |
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| Georgia Railroad..... | 321 | St. L., Vandalia & Terre Haute..... | 198 |
| Grand Trunk..... | 277 | St. Paul & Duluth..... | 134 |
| Gulf, Colorado & Santa Fe..... | 321 | Savannah, Florida & West..... | 294 |
| Han. June, Han. & Gettysburg..... | 391 | Seaboard & Roanoke..... | 295 |
| Hartford & Conn. Western..... | 171 | Shenandoah Valley..... | 489 |
| Housatonic..... | 167 | South Carolina..... | 183 |
| Illinois Central & Broad Top Mt..... | 134 | Southern Pacific (Cal.)..... | 358 |
| Illinois Central..... | 214 | Terre Haute & Indianapolis..... | 148 |
| Lake Shore & Mich. So..... | 294 | Texas & New Orleans..... | 247 |
| Lawrence..... | 213 | Texas & Pacific..... | 147 |
| Lehigh Coal & Navigation Co..... | 128 | Toledo, Ann Arbor & N. Mich..... | 291 |
| Lehigh Valley..... | 52 | Troy & Greenfield..... | 407 |
| Little Miami..... | 448 | Union Pacific..... | 199 |
| Long Island..... | 21 | Utah Central..... | 325 |
| Louisiana Valley..... | 247 | Utah & Black River..... | 128 |
| Marquette, Hough. & Ont..... | 277 | Vicksburg & Meridian..... | 393 |
| Mexican Central..... | 329 | Virginia Midland..... | 27 |
| Michigan Central..... | 295 | Western North Carolina..... | 247 |
| Mill. Lake Shore & Western..... | 293 | Wilmington & Northern..... | 479 |
| | | Wisconsin Central..... | 432 |
| | | Worcester, Nashua & Roch..... | 432 |
| | | York & Peachbottom..... | 301 |

Elizabethtown, Lexington & Big Sandy.

This company owns a line from Lexington, Ky., to Denton, 101.91 miles, and from Ashland Coal & Iron Junction to the Big Sandy River, 7.28 miles. It leases 21.46 miles from the Ashland Coal & Iron Co., and 8.77 from the Chesapeake & Ohio, making up a continuous line from Lexington, Ky., to Huntington, W. Va., 139.42 miles. There are 19.78 miles of sidings. The report is for the year ending Dec. 31.

The road is the western extension of the Chesapeake & Ohio. Its trains run from Lexington to Louisville over the Louisville & Nashville track.

The equipment consists of 16 locomotives; 12 passenger, 3

combination and 3 mail and express cars; 238 box, 75 stock, 62 flat, 158 coal and 6 caboose cars; 1 tool car.

The general account, condensed, is as follows:

| | |
|-----------------------------------|-------------|
| Stock..... | \$3,500,886 |
| Funded debt..... | 3,543,000 |
| Certificates of indebtedness..... | 480,530 |
| Accounts and balances..... | 218,042 |
| Income account, balance..... | 152,365 |

Total.....\$7,912,813

| | |
|----------------------------|-------------|
| Road and equipment..... | \$7,906,450 |
| Sinking fund..... | 247,436 |
| Accounts and balances..... | 60,182 |
| Cash..... | 8,745 |

7,912,813

The funded debt includes \$3,500,000 first-mortgage 6s and \$43,000 equipment trust 6s.

The traffic for the year was as follows:

| | 1884. | 1883. | Inc. or Dec. | P. c. |
|-----------------------|---------|---------|--------------|--------------|
| Passenger..... | 222,987 | 219,063 | I. | 3,924 1.8 |
| Freight..... | 530,824 | 374,338 | I. | 156,486 44.2 |
| Serv. and switch..... | 262,459 | 263,954 | D. | 1,495 0.6 |

Total.....1,025,270 857,355 I. 167,915 19.6

Pass. car-miles.....883,956 912,744 D. 28,788 3.2

Frt. car-miles.....6,858,831 5,031,167 I. 1,827,664 36.3

Passenger carr.....225,210 230,640 D. 5,430 2.3

Passen. miles.....7,818,810 8,467,587 D. 648,777 7.7

Tons freight car.....696,358 681,118 I. 15,240 2.2

Ton-miles.....60,328,428 44,634,300 I. 15,694,128 35.2

Av. train load:

| | | | | |
|---------------------|-------|-------|----|---------|
| Passengers, No..... | 35.1 | 38.7 | D. | 3.6 9.2 |
| Freight, tons..... | 111.8 | 119.2 | D. | 7.4 6.2 |

Av. rate:

| | | | | |
|---------------------|------------|------------|----|---------------|
| Per pass. mile..... | 2.334 cts. | 2.229 cts. | I. | 0.105 ct. 4.7 |
| Per ton-mile..... | 0.915 " | 1.122 " | D. | 0.207 " 18.5 |

The earnings per train-mile were, in cents: Passenger, 91.47; freight, 102.25; all trains, 99.98; expenses, 66.15; net earnings, 33.83 cents.

The earnings for the year were:

| | 1884. | 1883. | Inc. or Dec. | P. c. |
|-----------------|-----------|-----------|--------------|---------------|
| Freight..... | \$551,917 | \$500,672 | I. | \$51,245 10.2 |
| Passengers..... | 182,511 | 188,772 | D. | 6,261 3.3 |
| Mail, etc..... | 28,200 | 23,658 | I. | 4,542 18.9 |
| Total..... | \$762,628 | \$713,102 | I. | \$49,526 6.9 |
| Expenses..... | 504,575 | 496,091 | I. | 8,484 1.7 |

Net earnings.....\$258,053 \$217,041 I. \$41,012 18.8

Gross earn. per mile.....5,470 5,113 I. 355 6.9

Net " ".....1,850 1,557 I. 293 18.8

Per cent. of expenses.....66.2 69.6 D. 3.4

The earnings, both gross and net, were the largest ever reported on this line, in spite of diminished local traffic.

The receipts and disbursements for the year were:

| | |
|--|-----------|
| Net earnings..... | \$258,053 |
| Miscellaneous receipts..... | 1,188 |
| Certificates of indebtedness issued..... | 40,290 |
| Capital stock issued..... | 1,218 |
| Increase in sundry liabilities..... | 44,763 |
| Total..... | \$345,509 |

Interest, rentals and taxes.....\$224,718

Construction (including old accounts).....80,239

Equipment trust bonds redeemed.....5,000

Increase in cash and cash assets.....35,552

345,509

Expenditures for betterments of property amounted to \$38,700, the chief items being for ballast and new sidings.

Renovals included 512 tons of steel rails and 47,875 new ties. The condition of the road was improved by general repairs to bridges and by ballasting track with broken stone.

The increase in business was chiefly in through traffic. The rates on through business were very low, reducing largely the amount received on this business. The through freight for points north of Cincinnati, which formerly went by Ashland, was last year sent over the Kentucky Central from Winchester, increasing the haul on this road.

Minneapolis & St. Louis.

At the close of the year 1884 this company owned a line from Minneapolis, Minn., to Angus, Ia., 260 miles; the Pacific Division, Hopkins, Minn., to Morton, 92; the Kalo Branch, 2; the Lake Park Branch, 1.5; the White Bear Branch, 12.5. It leased the Wisconsin, Minnesota & Pacific, 206.6 miles, making a total of 574.6 miles.

The White Bear Branch is operated by the St. Paul & Duluth Co., under lease. Of the leased road, 66 miles were operated under lease for six months of 1884; its earnings and expenses are included in the statements for that period only.

The equipment includes 69 locomotives; 18 passenger and 11 baggage, mail and express cars; 1,231 box, 52 stock, 654 flat and coal, and 36 caboose cars; 4 service cars.

The general account, condensed, is as follows:

| | |
|----------------------------|-------------|
| Common stock..... | \$5,761,280 |
| Preferred stock..... | 4,000,000 |
| Funded debt..... | 7,318,000 |
| Bills payable..... | 1,220,371 |
| Current accounts, etc..... | 555,755 |

Total.....\$18,855,326

Cost of road, equipment, etc.....\$18,149,506

Materials and fuel.....59,795

Current accounts.....217,443

Cash on hand.....8,081

Profit and loss.....470,501

18,855,326

There were no material changes in stock and bonds during the year.

Trains ran last year 1,318,136 miles, carrying 310,820 passengers 13,782,632 miles and 979,919 tons of freight 115,395,436 miles.

The earnings for the year were:

| | 1884. | 1883. | Inc. or Dec. | P. c. |
|-----------------|-------------|-------------|--------------|--------------|
| Freight..... | \$1,281,910 | \$1,220,163 | I. | \$61,747 5.1 |
| Passengers..... | 350,634 | 338,232 | I. | 12,392 3.6 |
| Other..... | 101,491 | 63,543 | I. | 37,948 5.5 |

Total.....\$1,734,025 \$1,621,928 I. \$112,097 4.9

Expenses.....1,251,125 1,314,972 D. 63,847 4.8

Net earnings.....\$482,900 \$306,956 I. \$175,944 43.3

In the expenses are items which do not belong to the expense of running the road, but the directors say that they are part of the receiver's indebtedness, which had to be paid in order to protect the property from sale for non-payment of judgment and taxes by said receiver. Deducting these items, the net earnings would be \$17,006, or \$1,000 per mile.

The report says: "In addition to these legitimate earnings of your road, represented by these figures, \$17,006, there is one other item which should be considered. The Dayton & Ironton road has been using our tracks for the past year without paying any compensation for the same. We are now negotiating with them for a settlement for the past year and a new arrangement for the next, and hope for a speedy settlement, which will swell our income for both years."

Continuing, the report states that during the year two miles of steel rails were laid upon the road, one mile of which was paid for out of the earnings and charged to expense account, and the other mile was paid for by the proceeds of a sale of a small piece of land, of no further use to the company. The net earnings for the year are shown to have been about 3 per cent. upon the capital stock, and the report states that that amount would have been declared as a dividend had it not been for back taxes and land damages, together with the judgment before mentioned.

Kansas City, Springfield & Memphis.

This company owns a line from Springfield, Mo., to Memphis, Tenn., 281.94 miles. Of this 138.76 miles are in Missouri, 141.27 in Arkansas and 1.91 in Tennessee. The road was completed Oct. 20, 1883. The report is for the year ending Dec. 31.

The road is operated in connection with the Kansas City, Fort Scott & Gulf, and under the same officers. The ownership of both roads is substantially the same, although the separate organization is maintained.

The equipment, Dec. 31 last, included 10 locomotives; 3 passenger cars; 325 box, 50 coal, 65 flat and 8 caboose cars. Large additions have been made since that date.

The general account, condensed, is as follows:

| | |
|-------------------------|---------------------|
| Stock | \$5,250,000 |
| Funded debt | 7,500,000 |
| Bills payable | 110,000 |
| Accrued interest, etc. | 79,950 |
| Total | \$12,939,950 |
| Road and equipment | \$12,776,498 |
| Supplies | 6,614 |
| Accounts and balances | 107,015 |
| Cash | 47,854 |
| Income account, balance | 1,969 |
| Total | 12,939,950 |

The funded debt includes \$7,000,000 first-mortgage 6s and \$500,000 plain 6s, not secured by mortgage and having 10 years to run. The last named bonds were issued early in 1884. The cost of road and equipment is \$45,316 per mile.

The traffic for the year was as follows:

| | |
|------------------------|----------------|
| Train miles: | |
| Passenger | 227,069 |
| Freight | 502,756 |
| Total | 729,825 |
| Passengers carried | 123,146 |
| Passenger-miles | 6,927,803 |
| Tons freight carried | 489,956 |
| Ton-miles | 79,758,303 |
| Av. train load: | |
| Passengers, No. | 30.5 |
| Freight, tons | 158.6 |
| Av. rate: | |
| Per passenger-mile | 3.060 cts. |
| Per ton-mile | 1.203 " |

The earnings per train mile were 165.0 cents; expenses, 115.5; net earnings, 49.8 cents.

The earnings for the year were:

| | |
|--|--------------------|
| Freight | \$957,141 |
| Passengers | 212,133 |
| Mails, etc. | 35,000 |
| Total (\$4.271 per mile) | \$1,204,274 |
| Expenses (69.8 per cent.) | 840,896 |
| Net earnings (\$1.289 per mile) | \$363,378 |

During the early part of the year business was interrupted by unusual and long continued floods, which were especially trying to the unsettled road-bed of a line just completed.

The result of the year was as follows:

| | |
|--|------------------|
| Net earnings, as above | \$363,378 |
| Traffic guarantee, Kan. City, Ft. Scott & Gulf Co. | 76,212 |
| Total | \$439,590 |
| Interest paid | 441,559 |
| Deficit for the year | \$1,969 |

This was a very good result for the first year's operation of a new road. Under the traffic guarantee the Kansas City, Fort Scott & Gulf Co. pays this company 15 per cent. of its gross earnings on business to and from this road.

The President's report gives the following description of the road: "The country which the road traverses is generally covered by timber. Eight miles east of Springfield it crosses the valley of James River, and from it gradually rises to the uneven divide (1,700 ft. above sea level), between the head waters of the Gasconade and White rivers. Following this divide to a point 87 miles east of Springfield, it descends into the Howell draft, which the road follows for about 12 miles, and, on leaving it, runs direct to the Arkansas state line, near Mammoth Spring, the head of Spring River, the valley of which is followed to Black River, a distance of 48 miles. From Black River to the Mississippi, excepting what is known as Crowley's Ridge, which rises about 70 ft. above the general elevation of the bottom land, the country is level, and much of it subject to overflow from the Mississippi River. The high water of the Mississippi River in 1883 and 1884 made apparent the necessity for raising the grade through this section higher than was originally contemplated, and it is now placed above any known flood. Abundant openings have been left, and it is confidently believed that the traffic of the road will never again be seriously interrupted by high water. It is proposed to still further strengthen the embankments in the St. Francis bottom, and, when they have become thoroughly settled, to ballast the track with stone, an abundance of which can be obtained along Spring River. It is also proposed, in the course of this and the next year, to fill 1.7 miles of pile bridging, which was put in to expedite the completion of the road at a time when it was impossible to build embankments. To carry out the plan for strengthening the embankments and filling the pile bridging will cost about \$55,000.

"At all interior stations ample depot grounds have been secured. At West Memphis the company has three-quarters of a mile of river front, and back of it sufficient grounds for all future needs. During the present year a number of additional tracks have been laid in the yards at that place, and arrangements made to place permanently there a large wharf-boat for the convenience of interchanging business between the

road and Mississippi River steamboats. The additional tracks and warehouse at this point cost about \$12,000.

"Passenger and freight cars are transferred across the river between West Memphis and Memphis, by the steam transfer boat, 'Charles Merriam,' which has capacity for crossing 350 cars each 24 hours.

"At Memphis the station grounds are convenient to the city, but are now thought to be insufficient to provide for the anticipated increase in business, and additional land is to be purchased. A contract has been made with the city of Memphis, which permits this company to lay, without expense for right of way, a track along the river front for 2,400 ft. to the elevator and mills located near the north end of the levee. The additional land, track on river front and additional side tracks are estimated to cost \$45,000.

"No passenger depot has been provided at Memphis, as it is believed that the eight companies having roads terminating there will, before long, unite in building a union passenger station. At present our business is done at the depot of the Mississippi & Tennessee Co.

"We have good track connections with nearly all of the roads terminating at Memphis, and have a car hoist at the junction of our track with that of the Memphis & Charleston. "Thirty-five miles of the track in Missouri and 19 miles in Arkansas are ballasted with broken rock, and it is proposed to ballast 15 to 20 miles during 1885.

"Up to the end of last year very little fencing had been done; but the country is rapidly settling up, and the demands of land owners are such, and for safety in operating the road, it will be necessary to fence about 25 miles this year. The cost will be \$500 per mile."

Kansas City, Fort Scott & Gulf.

At the close of its last fiscal year this company operated the following lines:

| | |
|---|---------------|
| | Miles. |
| Kansas City, Fort Scott & Gulf, Kansas City to the south line of Kansas | 159.92 |
| Rich Hill Railroad | 27.54 |
| Fort Scott, Southeastern & Memphis | 102.85 |
| Kansas and Missouri | 26.18 |
| Short Creek & Joplin | 22.38 |
| Memphis, Kansas & Colorado | 49.79 |
| Total, Dec. 31, 1884 | 388.68 |

There was no change in mileage during the year. The leased lines named are owned by the company, which holds all their stock and guarantees their bonds.

The Kansas City, Springfield & Memphis road, from Springfield, Mo., to Memphis, Tenn., is owned by the owners of this road, and is operated in its interest, but has a distinct organization and is not included in the report.

The equipment consists of 76 locomotives; 32 passenger and 19 baggage, mail and express cars; 687 box, 28 refrigerator, 70 fruit, 207 stock, 52 flat, 1,212 coal and 46 caboose cars; 2 officers' cars, 1 wrecking car and 1 pile driver.

The general account, condensed, is as follows:

| | |
|--------------------------------------|---------------------|
| Common stock | \$4,648,000 |
| Contracts for preferred stock | 2,750,000 |
| Funded debt | 2,962,000 |
| Bills, accounts and balances payable | 375,071 |
| Sinking funds | 160,325 |
| Land income account | 43,987 |
| Income account, balance | 442,428 |
| Total | \$11,381,811 |
| Road and equipment | \$9,939,404 |
| Stocks and bonds | 853,078 |
| Materials | 126,343 |
| Sinking fund accounts | 131,280 |
| Accounts and balances | 288,761 |
| Cash | 62,945 |
| Total | 11,381,811 |

The funded debt in the balance sheet includes \$2,355,000 first-mortgage 7s and \$607,000 Fort Scott Equipment Co. 6s. Besides this the company guarantees \$3,122,000 bonds of its leased lines. The interest charge, including leased line bonds, is \$411,870 yearly. Last year there were \$47,000 firsts and \$60,000 equipments retired and \$341,000 leased line bonds issued.

The Land Department reports sales amounting to \$4,110, and cash collections of \$75,459. The expenses were \$6,441. The land assets amounted to \$278,988, including 5,040 acres unsold, mineral reserved on lands sold, and \$98,875 land notes and contracts.

The traffic for the year was as follows:

| | | | | |
|------------------------|------------------|------------------|--------------|----------------|
| Train miles: | 1884. | 1883. | Inc. or Dec. | P. c. |
| Passenger | 485,402 | 429,211 | I. | 56.191 |
| Freight | 886,548 | 661,768 | I. | 224,780 |
| Serv. and switch. | 619,292 | 442,016 | I. | 177,276 |
| Total | 1,991,242 | 1,532,995 | I. | 458,247 |
| Pass. car miles | 2,108,303 | 1,679,151 | I. | 429,152 |
| Freight car miles | 27,877,336 | 12,870,389 | I. | 5,106,947 |
| Pass. carried | 600,217 | 478,781 | I. | 130,436 |
| Passenger miles | 20,087,919 | 17,428,837 | I. | 3,240,982 |
| Tons freight car | 1,165,591 | 875,649 | I. | 289,942 |
| Ton-miles | 136,210,265 | 92,750,215 | I. | 43,460,060 |
| Av. train load: | | | | |
| Passengers, No. | 37.0 | 30.0 | I. | 7.0 |
| Freight, tons | 153.6 | 140.2 | I. | 13.4 |
| Av. rate: | | | | |
| Per pass. mile | 2.77 cts. | 2.88 cts. | D. | 0.11 ct. |
| Per ton-mile | 1.21 " | 1.48 " | D. | 0.27 " |

In addition to the mileage above this company's engines ran 365,711 miles on the Kansas City, Springfield & Memphis road. Locomotive service cost 15.87 cents per mile run.

The earnings for the year were:

| | | | | | |
|----------------------|--------------------|--------------------|-------------|------------------|-------------|
| Freight | \$1,046,161 | 1883. | \$1,373,250 | Inc. or Dec. | P. c. |
| Passengers | 572,483 | 501,257 | I. | 71,226 | 14.2 |
| Mail and express | 64,039 | 55,430 | I. | 8,599 | 15.5 |
| Miscellaneous | 139,709 | 86,275 | I. | 53,434 | 62.0 |
| Total | \$2,422,442 | \$2,016,212 | I. | \$406,230 | 20.2 |
| Expenses | 1,407,693 | 1,178,544 | I. | 229,149 | 19.4 |
| Net earnings | \$1,014,749 | \$837,668 | I. | \$177,081 | 21.1 |
| Gross earn. per mile | 6.233 | 5.188 | I. | 1.045 | 20.2 |
| Net earn. per mile | 2.611 | 2.156 | I. | 455 | 21.1 |
| Per cent. of exps. | 58.1 | 58.5 | D. | 0.4 | 0.7 |

The earnings were largely increased by the traffic carried to and from the new Kansas City, Springfield & Memphis road. Taxes are included in expenses.

The result of the year was as follows:

| | |
|--|--------------------|
| Net earnings, as above | \$1,014,749 |
| Interest received | 27,396 |
| Total | \$1,042,145 |
| Interest paid | \$406,107 |
| Sinking fund, etc. | 88,320 |
| Traffic guarantee, K. C., Spr. & Memphis | 76,212 |
| Dividends | 452,344 |
| Total | 1,022,983 |
| Surplus for the year | \$19,162 |
| Balance from previous year | 197,090 |
| Total surplus to 1885 | \$216,252 |

The dividends paid were 8 per cent. on preferred and 5 per cent. on common stock.

Renewals and improvements included 26.48 miles of steel rails (making 218.41 miles of steel track now in use), 115,394 new ties; 12.5 miles new sidings; 18.13 miles of track ballasted, and 24.1 miles of road fenced.

The report says: "The Kansas City Belt Railway was projected to furnish increased facilities for the movement of freight for the railroads centering at Kansas City, and is owned by this company in connection with the Atchison, Topeka & Santa Fe Railroad Co. and the Kansas City Stock Yards Co. The investment of this company to Jan. 1, 1885, amounted to \$195,000, for which it received stock and \$195,000 of the first mortgage 6 per cent. bonds of the Belt Railway Co. It has sold these bonds with its guarantee attached for an amount which fully covers the investment.

"Subscriptions to the securities of the Kansas City, Clinton & Springfield Railway Co. were offered to the stockholders in August last, and progress in the construction of the road has been made as rapidly as an unfavorable winter season would admit. It is expected that the whole road will be completed during September, 1885."

Chesapeake, Ohio & Southwestern.

This company owns a line from Memphis, Tenn., to Elizabethtown, Ky., 351.58 miles, and leases the Cecilian Branch of the Louisville & Nashville, from Cecilia, Ky., to Louisville, 46.90 miles, making 398.48 miles operated. The report is for the year ending Dec. 31.

There are 221.58 miles laid with steel rails and 177 with iron. There are 43.43 miles of sidings, of which 8.69 miles were laid last year.

The equipment consists of 64 locomotives; 22 passenger, 1 combination and 8 baggage, mail and express cars; 432 box, 95 stock, 100 flat, 353 gondola, 210 coal and 37 caboose cars; 1 officers' car, 52 construction and 34 boarding and tool cars.

The general account, condensed, is as follows:

| | |
|---------------------------|---------------------|
| Common stock | \$6,030,600 |
| Preferred stock | 3,696,000 |
| Funded debt | 11,073,000 |
| Sundry liabilities | 963,183 |
| Balance | 26,265 |
| Total | \$21,729,148 |
| Road and equipment | \$19,753,103 |
| Stocks and other property | 278,531 |
| Company's bonds unsold | 1,527,000 |
| Cash and receivables | 170,514 |
| Total | 21,729,148 |

The funded debt includes \$300,000 Paducah & Elizabethtown 8s and \$200,000 old 6s; \$6,176,600 first-mortgage 5s; \$3,865,400 second-mortgage 6s and \$531,000 equipment trust 6s. The company holds unsold \$106,600 of the firsts and \$1,420,400 of the seconds.

The traffic for the year was as follows:

| | | | | |
|------------------------|------------------|------------------|--------------|----------------|
| Train miles: | 1884. | 1883. | Inc. or Dec. | P. c. |
| Passenger | 456,618 | 465,009 | D. | 8,381 |
| Freight | 871,017 | 750,213 | I. | 120,804 |
| Service and switch | 428,946 | 344,790 | I. | 84,156 |
| Total | 1,756,581 | 1,560,102 | I. | 196,479 |
| Passenger car miles | 1,404,546 | 1,414,039 | D. | 9,493 |
| Freight car miles | 13,454,712 | 11,730,442 | I. | 1,724,270 |
| Passengers carried | 444,006 | 394,334 | I. | 49,672 |
| Passenger miles | 12,734,715 | 13,066,211 | D. | 271,493 |
| Tons freight carried | 561,529 | 522,112 | I. | 39,417 |
| Ton-miles | 80,565,003 | 70,511,171 | I. | 18,094,732 |
| Av. train load: | | | | |
| Passengers, No. | 27.9 | 27.9 | | |
| Freight, tons | 10.8 | 94.0 | I. | 8.8 |
| Av. rate: | | | | |
| Per passenger-mile | 2.551 cts. | 2.626 cts. | D. | 0.075 ct. |
| Per ton-mile | 1.093 | 1.300 | D. | 0.207 " |

The earnings per train-mile were, in cents: Passengers, 83.69; freight, 112.34; all trains, 103.54. The expenses were 79.44 and the net earnings 24.10 cents per train-mile.

The earnings for the year were:

| | | | | | |
|-----------------------|--------------------|--------------------|-----------|-----------------|-------------|
| Freight | \$978,434 | 1883. | \$916,141 | Inc. or Dec. | P. c. |
| Passenger | 324,817 | 338,669 | D. | 13,852 | 3.8 |
| Mail, etc. | 71,395 | 67,615 | I. | 3,780 | 5.6 |
| Total | \$1,374,646 | \$1,322,455 | I. | \$52,191 | 3.9 |
| Expenses | 1,034,095 | 1,013,534 | I. | 21,161 | 2.1 |
| Net earnings | \$337,951 | \$308,921 | I. | \$31,030 | 10.1 |
| Gross earn. per mile | 3.450 | 3.344 | I. | 106 | 3.2 |
| Net " " | 851 | 803 | I. | 48 | 6.0 |
| Per cent. of expenses | 75.4 | 76.6 | D. | 1.2 | 1.6 |

The increase in earnings was checked by the general depression in business, resulting in a falling off in local traffic and a reduction in rates.

The income statement is as follows:

| | |
|--|--------------------|
| Net earnings, as above | \$337,951 |
| Real estate sold | 182,583 |
| Bonds sold | 431,000 |
| Miscellaneous receipts | 28,551 |
| Increase in accounts receivable | 217,431 |
| Increase in floating debt | 217,431 |
| Total | \$1,199,764 |
| Interest, taxes, etc. | \$556,179 |
| Rental Cecilian Branch | 60,000 |
| Sinking fund | 5,000 |
| Increase in supplies | 9,914 |
| New construction, equipment, real estate, etc. | 508,971 |
| Total | 1,199,764 |

Interest and rentals were \$276,228 in excess of the net earnings for the year.

Expenses include some charges that properly belong in construction. The road was much improved by filling trestles, ditching, widening embankments and other repairs. During the year 66.83 miles of iron rails were replaced by steel and 166,049 new ties were put in the track. The main shops at Paducah were completed, giving the company sufficient facilities for making all repairs to its equipment. There were added to the equipment 17 new locomotives. A large increase of the car equipment is needed, both to reduce the amount now paid for car mileage and to enable the company to develop and increase its coal traffic.

The Short Route transfer track at Louisville, completing the connection of this road with the Chesapeake & Ohio, was completed in May and is operated by this company. This connection has been of great advantage to the road. The completion of the Louisville, New Orleans & Texas road, built by parties largely interested in this road, is expected to bring it much additional business. It had little effect last year, however, as the road was not completed until October, and owing to the constant work needed to bring it into condition, confined its attention entirely to local business, and did not enter into any competition for through traffic until after the close of the year.

The earnings for the first three months of 1885 show a considerable increase over the corresponding month of 1884. Since March, however, this increase has not kept up, owing to the increase in competition and the severe cutting of rates. So far this company has not entered actively into that competition, preferring not to carry business at a loss.